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(54) **A lock assembly and a striking plate**

(57) A striking plate (50) for engagement with a locking pawl member (20), said striking plate (50) having:

- a base (52) configured to be mounted against a frame (1) of a window assembly,
- a rear side (63) and an opposite front side,
- a wall (58) at said front side having a face (59) facing said rear side (63), a portion of said face (59) defining an

abutment area for a portion of said pawl member (20) in a locked position, an inclined guide surface (62) for said pawl member (20),

- a slot (51) between said guide surface (62) and said front wall (58) for receiving said pawl member
- said face (59) defining a slideway for said portion of said pawl member (20), said face (59) extending towards said rear side (63) in a direction away from said base (63).

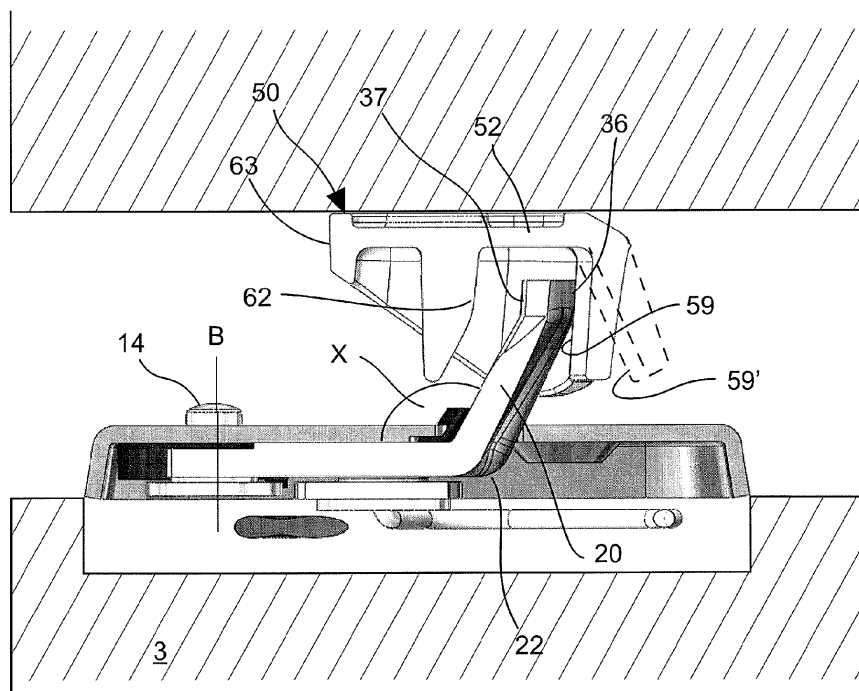


Fig. 5

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to an improved lock assembly, and a striking plate, 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. More particularly, the lock assembly comprises a casing configured to be mounted on the sash, a locking arm, one end of the locking arm being pivotally connected to the casing and the other end of the locking arm being bent to form a pawl member extending at an angle with the rest of the locking, creating a bend in the locking arm, a locking mechanism arranged in the casing for turning the locking arm between a first position defining an unlocked position and a second position defining a locked position, and a striking plate having a base configured to be mounted against the frame, a rear side and an opposite front side, a wall at the front side having a locking face facing the rear side, a portion of the locking face defining an abutment area for a portion of the pawl member in the locked position.

BACKGROUND OF THE INVENTION

[0002] EP 2 281 984 discloses a lock assembly as described above, 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 2 281 984 has an improved means for preventing intrusion, primarily in the area around the actuator slide by means of an added shield and has proven to be reliable, user-friendly and a generally very satisfying product with good burglar

proof characteristics.

[0005] 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 even further for some installations.

[0006] 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.

[0007] This object is achieved by providing a lock assembly for a ventilating window wherein the locking face defines a slideway for the aforementioned portion of the pawl member, the locking face extending towards the rear side in a direction away from the base.

[0008] Through the invention the resistance of the lock to withstand to a large impact force without opening is substantially improved in that the force applied in the aforementioned manner will tend to result in an upward movement of the tip of the pawl member as it slides upwards on the locking face towards the base. In the prior art striking plate the locking wall has an inner abutment face inclined in the opposite direction which leads to a more disadvantageous deformation of the locking arm.

[0009] The tip of the pawl member including the aforementioned portion may extend at a right angle, or substantially at a right angle, with the rest of the locking arm. Also, at least a portion of the pawl member can be tapered as a result of the sides of the pawl member converging to the tip of the pawl member.

[0010] 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

[0011] 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 1a and bb are schematic perspective views of a window assembly, seen from the building outside and from the building inside, respectively, the building not being shown,

Fig. 2 is a schematic vertical cross-sectional view of the window assembly of fig. 1a, in a closed position of the window, as seen through the upper frame and sash member,

Fig. 3 is a front top of a prior art striking plate,

Fig. 4 is a schematic perspective view of a striking plate according to the invention,

Fig. 5 is a cross-sectional view of the striking plate of fig. 4, taken along line V-V, and

Fig. 6 is a view is a sectional view similar to fig. 5, showing another embodiment of the striking plate of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] In the following detailed description a window assembly with a lock assembly having the novel striking plate according to the invention will be described by exemplary embodiments.

[0013] Figs. 1a and 1b shows schematically a conventional window assembly with a frame 1 and a sash 2, each having parallel opposite upright members and parallel opposite horizontal members. Reference numerals 3 and 4 designate the upper horizontal members of the sash and the frame, respectively. The window sash 2 has a window pane 5 and is pivotally mounted to the frame 1 by means of pivotal hinges, with an axis of rotation X parallel with the horizontal sash members and the horizontal frame members. Preferably, the hinges are located half way between the upper and lower horizontal members of the sash 2.

[0014] The drawings illustrate the window assembly as it would be mounted in an inclined building roof and with the window in the open position; the invention can be equally applied also to bottom or top hung window assemblies, including such mounted in a substantially vertical façade. Preferably, the frame 1 members and sash 2 members are for the major part wooden, although it is also possible to use metal members, or molded plastic members.

[0015] Fig. 1a shows the window assembly of a preferred embodiment as seen from the outside of a building while fig. 1b shows the assembly as seen from the inside of a building. Fig. 1b shows a handle 8 mounted on the upper sash member 3, for opening the window defined by the sash 2 and the pane 5 and for opening a ventilation passage in the window sash 2.

[0016] In a closed position of the window, the sash 2 is oriented substantially parallel with the frame 1 as shown in fig. 2 which is a partial cross-sectional view through the conventional window assembly of fig. 1a, provided with a prior art lock assembly as shown in eg. European Patent no. 2 281 984. A casing 10 of the lock assembly is secured to the upper sash member 3, and a striking plate 50' of the lock assembly has a base 52 which is mounted onto the frame member 4, such as by screws and fastening pins 56. Details of this prior art striking plate 50' are shown in fig. 3.

[0017] Shown schematically in fig. 2 is an operator arm 12 of the lock assembly which is secured to the aforementioned handle 8 which is hinged to the sash member 3 at hinge 9. In figure 2 an actuator slide 16 is shown in the locked position in which the window is locked in relation to the frame 4 and cannot be opened without activating the lock assembly. The lock assembly normally will include two locking arms 22 that are each provided

with a pawl member 20 at one end. The pawl members 20 extend through curved slots 18 in the casing 10, to project upwards from the casing 10 towards the frame member 4 with the striking plate 50. The actuator slide 16 extends through a straight slot in the casing 10. Fastening pins 14 are used for pivotally connecting the locking arms 22 to the casing 10.

[0018] In operation, a person will grab the handle 8 and turn it to move the actuator slide 16, thereby turning locking arms 22 with pawl members 20 about respective pivot axes B, to disengage the pawl members 20 from locking faces 59' of the striking plate 50'. The prior art striking plate 50' of European Patent no. 2 281 984 is shown in fig. 3.

[0019] The general principle of the engagement between the pawl members 20 and the striking plate is also illustrated in fig. 4 which shows parts of the lock assembly with an embodiment of the novel striking plate 50 according to the present invention seen in an inverted position for illustrative purposes. Like numerals will be used herein to designate parts and features of the novel striking plate 50 that are also parts and features of the prior art striking plate 50' of fig. 3; the novel striking plate 50 may be largely similar to the prior art striking plate 50' of fig. 3, but for the configuration of the locking faces 59 to be described further below.

[0020] In the unlocked position of the lock assembly the locking arms 22 have been turned about axis B in a first direction, into a position with the pawl members 20 free of the locking faces 59 whereby in fig. 2 the upper member 3 of the sash 2 is free to move to the right by turning the sash 2 about axis X to the position shown in fig. 1b.

[0021] As the window is turned towards the closed position from the open position shown in fig. 1b, the pawl members 20 approach the striking plate 50', 50 whereby the locking arms 22 are urged to turn about axis B in a counter-direction towards their locking position. This happens through an inner face 37, seen best in fig. 5, of each pawl member 20 touching on a respective guide surface 62 on the striking plate 50, 50'.

[0022] Fig. 5 shows 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 receiving a fastening/pivot pin 14 whilst the other end is bend over at a bend 39 to form the pawl member 20. The pawl member 20 may be at an angle α with the remainder of the locking arm 22 in the range 115 and 120°, such as approximately 118°, which range of angles has been found to give good results for many purposes.

[0023] The outward surface at the tip of the pawl member 20 is formed with an abutment area 36 for abutment with the locking face 59 of the striking plate 50.

[0024] The pawl member 20 is preferably provided with narrow sides 38, as seen best in fig. 4, that converge towards the tip of the pawl member 20 for facilitating entry

of the pawl member 20 into a slot 51 of the striking plate 50. Entry of the pawl members 20 happen as the locking arms 22 turn about axis B while they are simultaneously moved with the sash towards the frame member 4 on turning the sash 2 about axis X to the closed position. The portion of the pawl member 20 closest to the bend 39 may be profiled to improve the resistance of the pawl member 20 to be bend over when a large reaction force is applied to the abutment area 36 of the pawl member 20, as could happen when an intruder seeks to open the window by applying a force onto the sash member 3 to the right in fig. 5.

[0025] As shown in fig. 4 and 5 the base 52 of the striking plate 50 is provided with a locking wall 58 on two of its corners, and has a rear side 63 opposite the locking wall 58. The locking wall 58 has on the inside closest to the rear side 63 the aforementioned locking face 59 for abutment with the abutment area 36 of the pawl members 20. Two slots 51 are defined for receiving the pawl members 20 between the guide face 62 arranged on a protrusion 61 and the locking wall 58.

[0026] Comparing now the prior art striking plate 50 of fig. 3 with the novel striking plate 50 according to the present invention and shown in figs. 4 and 5 it can be seen that the novel striking plate 50 provides a resistance against breakage of the lock assembly in that the locking face 59 is slanted backwards towards the rear side 63. In this way, if attempts are made to force the window open without turning the pawl members 20, by applying a horizontal force onto the upper sash member 3 to the right in fig. 5, an increased resistance against mechanical failure of the pawl members 20 is obtained by the locking face 59 acting as a slideway. A force applied in the aforementioned manner will tend to result in an upward movement of the tip of the pawl member 20 as it slides upwards on the locking face 59. In the prior art striking plate 50 of fig. 3 the locking wall 58 has an inner abutment face 59' inclined in the opposite direction, as indicated very schematically by the dashed lines in fig. 5, which will lead to a more disadvantageous deformation of the locking arm 22.

[0027] Shown in fig. 6 is an embodiment of the invention where the turning axis B of the locking arms 22 is slanted somehow in respect to the plane A of the window by angle β . This has proven beneficial to accommodate for differently sized windows, i.e. windows where the distance between the upper and lower horizontal sash members 3 is relatively small. In such smaller windows, as the window is turned around axis X through a given angle the horizontal displacement of the sash member 3 and, hence, the locking arms 22, is relatively small compared to the displacement of the locking arms 22 of a larger window turned through the same angle. This may in certain instances require a different movement of the pawl member 20 to allow for a smooth entry thereof into the slots 51 of the striking plate 50 as the locking arm 22 is turned to the locking position for engagement of the pawl member 20 with the locking face 59. It has been found

that this may be achieved by providing a slight shifting in the orientation of the turning axis B as reflected by dashed line B' in fig. 6 (compare with fig. 2), without any need for otherwise modifying the lock assembly. This modification may also be implemented for windows using a conventional striking plate 59' as illustrated in fig. 3. Shown in fig. 6 by line C is also a plane coincident with locking face 59 and rearwardly inclined towards rear side 63, that is extending towards said rear side 63 in a direction away from the base 52 which is mounted against the frame 4, in contrast to the locking face 59' shown in fig. 3 which runs in an outwardly oriented plane.

[0028] 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.

[0029] 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 window assembly having a sash (2) arranged to be openable with respect to a frame (1) by pivotal movement about a pivot axis (X) parallel to a pair of opposed sash members (3), said lock assembly comprising:
 - casing (10) configured to be mounted on said sash (2),
 - a locking arm (22), one end of said locking arm (22) being pivotally connected to said casing (10),
 - the other end of said locking arm (22) being bent to form a pawl member (20) extending at an angle with the rest of the locking arm (22) and creating a bend (39) in the locking arm (22),
 - a locking mechanism arranged in said casing (10) for turning said locking arm (22) between a first position defining an unlocked position and a second position defining a locked position, and
 - a striking plate (50) having i) a base (52) configured to be mounted against said frame (1), ii) a rear side (63), iii) a front side opposite said rear side (63), iv) a wall (58) at said front side having a locking face (59) facing said rear side (63), a portion of said locking face (59) defining an abutment area for a portion (36) of said pawl member (20) in said locked position,
 - **characterized in** said locking face (59) defining a slideway for said portion (36) of said pawl member (20), said locking face (59) extending towards said rear side (63) in a direction away from said base (52).
2. The lock assembly of claim 1, said slideway being

defined by a flat surface (59) inclined towards said rear side (63) in a direction away from said base (52).

ber (20), said slideway (59) extending towards said rear side (63) in a direction away from said base (63).

3. The lock assembly according to claim 1 or 2, wherein said angle is between 115° and 120°. 5
4. The lock assembly according to any of claims 1 to 3, wherein the tip of said pawl member (20) including said portion (36) extends at a right angle, or substantially at a right angle, with the rest of the locking arm (22). 10
5. The lock assembly according to any of the preceding claims, wherein at least a part of the pawl member (20) is tapered as a result of the sides of the pawl member (20) converging to the tip of the pawl member (20). 15
6. The lock assembly according to any of the preceding claims, said striking plate (50) including a guide surface (62) extending between said rear side (63) and said front side, said pawl members (20) being urged to turn between said positions as an inner face (37) of each pawl member (20) touch on said guide surface (62). 20
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7. The lock assembly according to the preceding claim, said striking plate (50) including a slot (51) between said guide surface (62) and said front wall (58) for receiving said pawl member (20). 30
8. The lock assembly according to any of the preceding claims, a turning axis (B) of said locking arms (22) being oriented such that the distance between the tip of said pawl member (20) and said base (52) increases as said locking arm (22) is turned towards said locked position contacting said locking face (59). 35
9. A striking plate (50) for engagement with a locking pawl (20), said striking plate (50) having: 40
 - a base (52) configured to be mounted against a frame (1) of a window assembly,
 - a rear side (63) and an opposite front side, 45
 - a wall (58) at said front side having a locking face (59) facing said rear side (63), a portion of said locking face (59) defining an abutment area for a portion of said pawl member (20) in a locked position, 50
 - an guide surface (62) for said pawl member (20) extending between said rear side (63) and said front side,
 - a slot (51) between said guide surface (62) and said front wall (58) for receiving said pawl member (20), 55
 - **characterized in** said locking face (59) defining a slideway for said portion of said pawl mem-

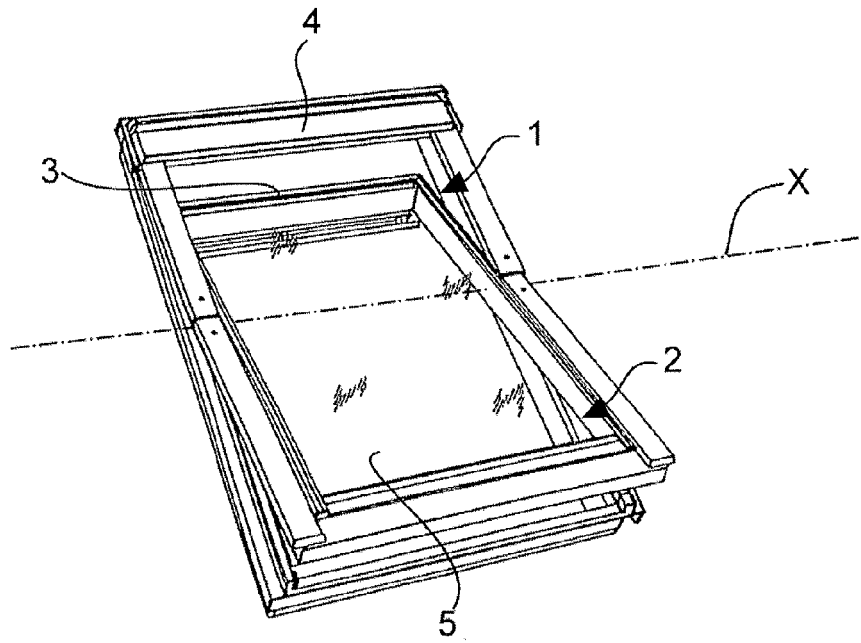


Fig. 1a

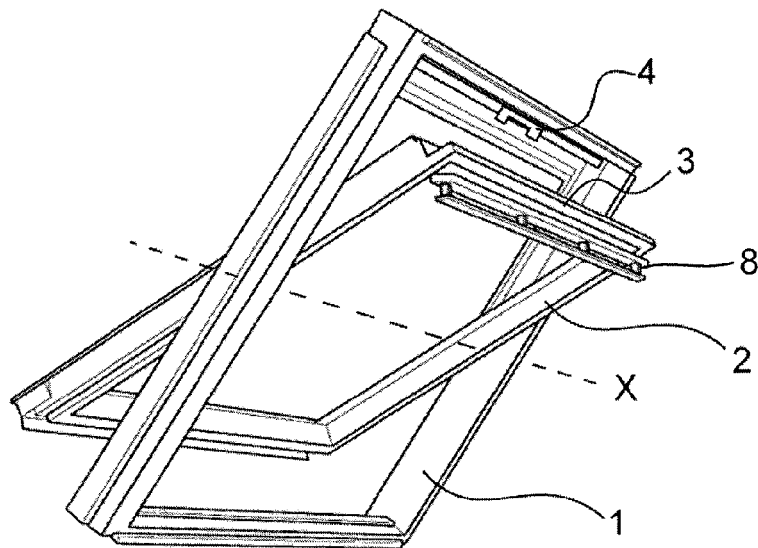


Fig. 1b

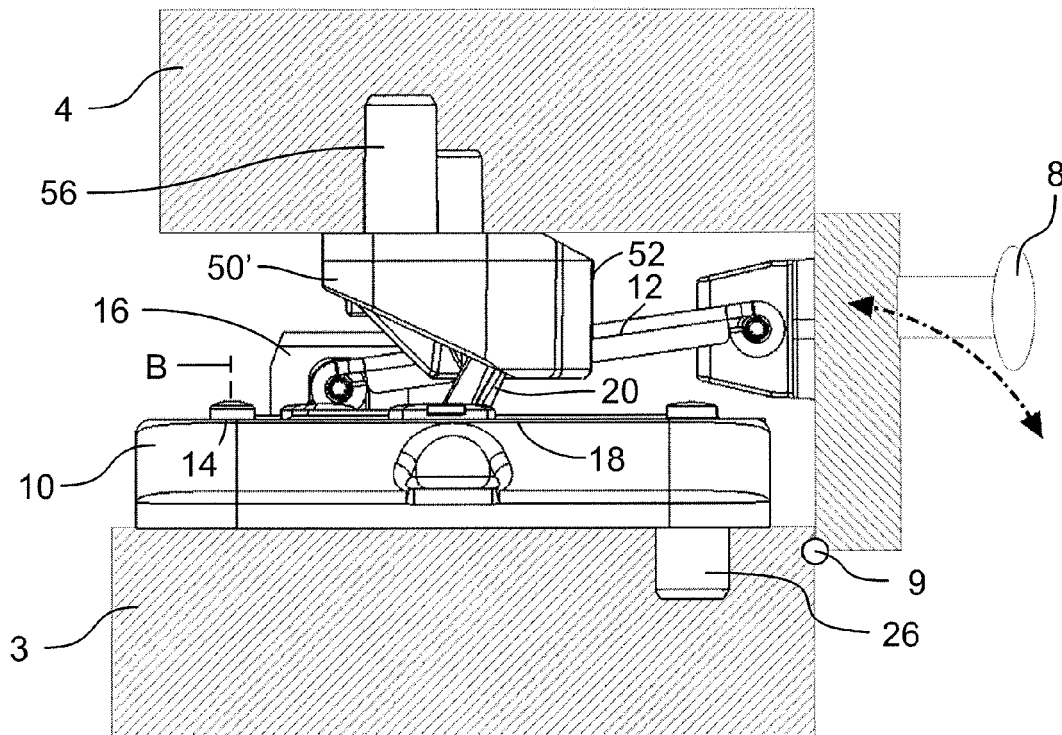


Fig. 2

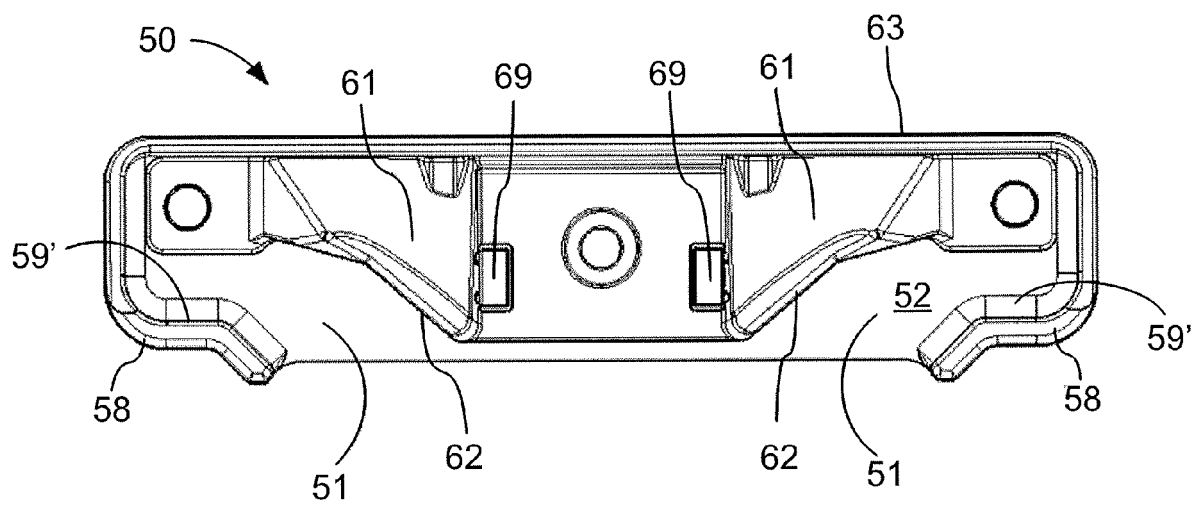


Fig. 3

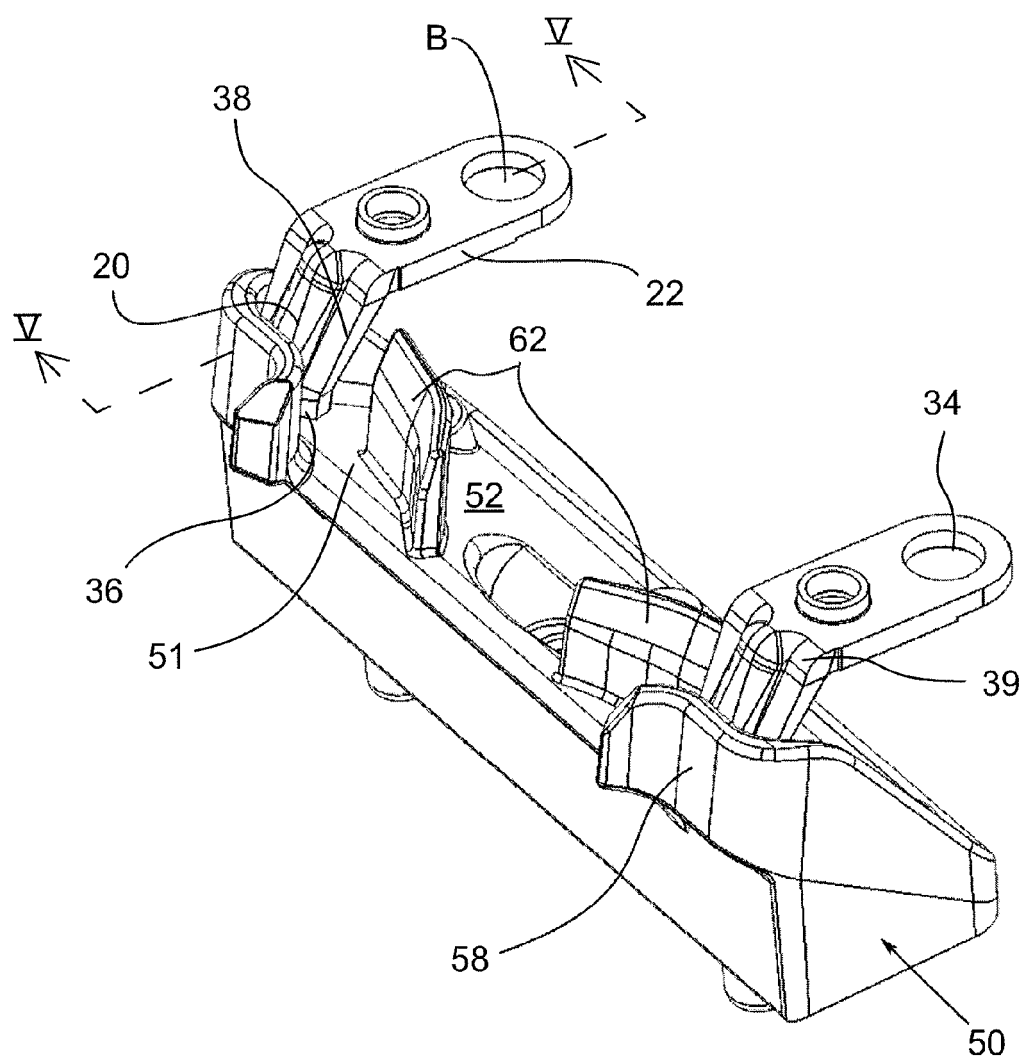


Fig. 4

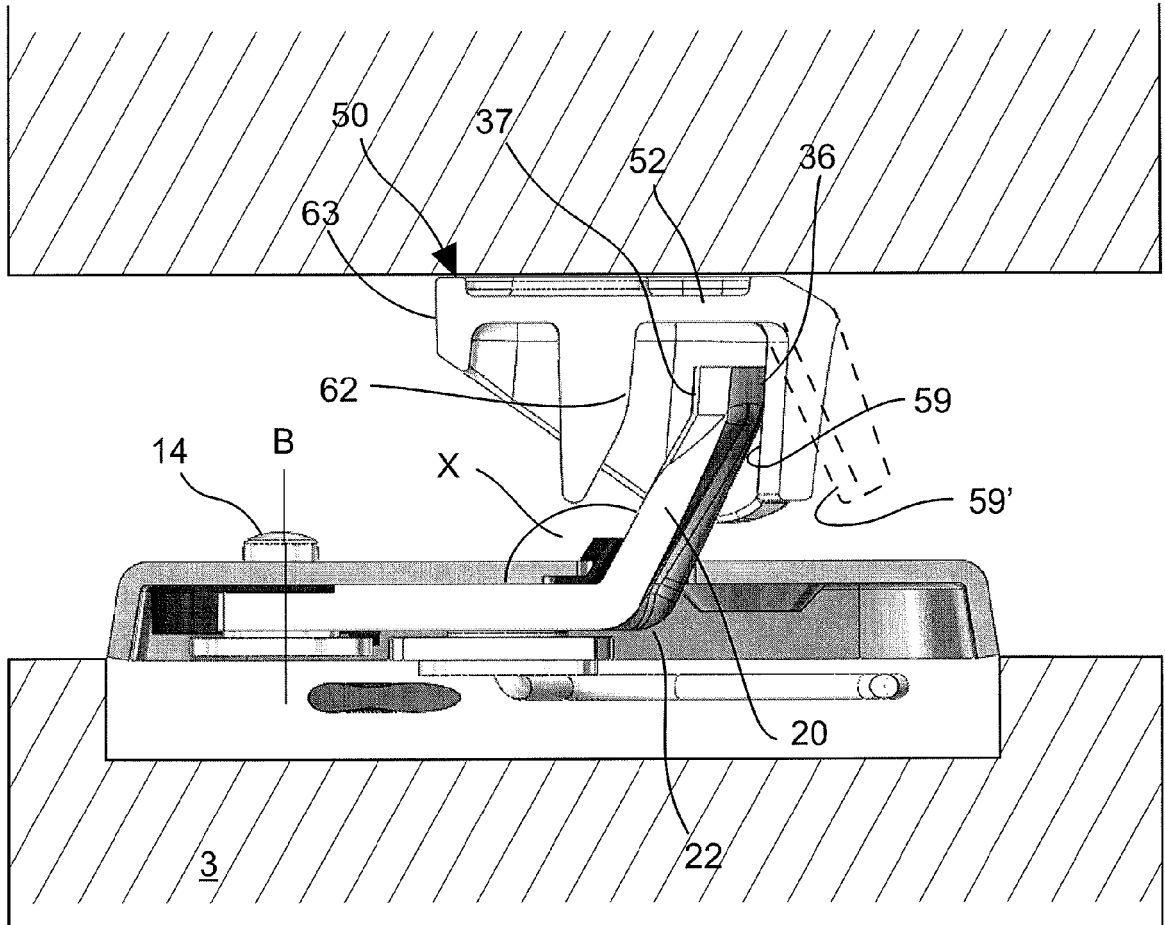


Fig. 5

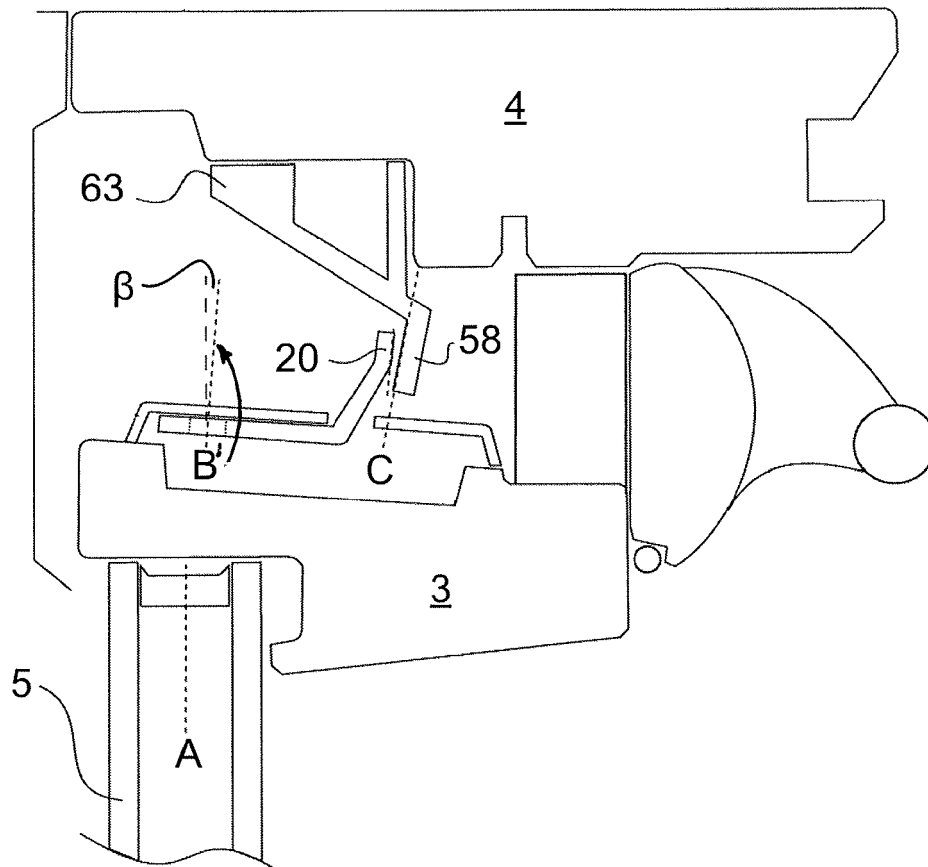


Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 11 19 5246

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) E05B
Place of search The Hague		Date of completion of the search 28 June 2012	Examiner Geerts, Arnold
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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