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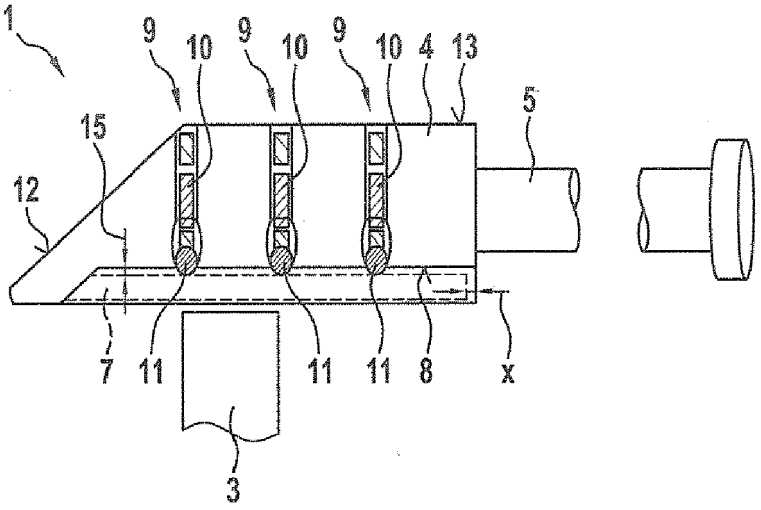
(54) **BOLT FOR A MORTISE LOCK**

(57) The invention regards a bolt (1) of a mortise lock (2), the bolt (1) being adapted to be introduced into a striking plate (3) and comprising: a main body (4) including a connecting part (5) adapted to be coupled with a driving element (6) of the mortise lock (2), and a tension adjuster plate (7) provided on an outer surface (8) of the main body (4), wherein the tension adjuster plate (7) is linearly slidable along the outer surface (8) of the main body (4).

Fig. 1



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Description

[0001] The invention regards a bolt for a mortise lock. Further, the invention regards a mortise lock including such a bolt. The bolt is particularly adapted to be introduced into a striking plate.

[0002] From the prior art, mortise locks are known. Such locks might include two bolts, wherein one of the bolts has a slanted surface and is used to keep the door closed. Another bolt is used to lock the door. Further, a door frame or a door leaf usually comprises a sealing element in order to seal the leaf against the frame. The sealing element is elastically deformed in when the door is closed and executes a restoring force to the leaf and the frame. Thus, a force acts on the leaf in the opening direction.

[0003] Due to said force, the bolt used for keeping the door closed is pressed against a striking plate into which the bolt is introduced. This means that a relatively high friction occurs.

[0004] From the prior art, there also is known a mortise lock design in which only one bolt is used. In this case, the one bolt has to fulfill two functions: On the one hand, the bolt has to keep the door closed, on the other hand, the bolt has to lock the door. To perform this two functionalities, the bolt can be moved from a door-closed position to locking position, in which the bolts protrudes farther from the door leaf than in the door-closed position. However, shifting the bolt from the door-closed position to the locking position has to be performed while the relative high friction as described above occurs. This renders locking the door uncomfortable or impossible.

[0005] It is an object of the invention to provide a lock especially with only one bolt, which allows simple handling when locking a door.

[0006] This object is solved by the features of the independent claim. The dependent claims contain advantageous embodiments of the present invention.

[0007] The bolt according to the invention allows a movement of a main body with respect to a tension adjuster plate. When the tension adjuster plate is pressed to a striking plate (e.g. due to a sealing element), the main body can be moved with respect to said tension adjuster plate thereby reducing frictional forces.

[0008] The inventive bolt of a mortise lock is adapted to be introduced into a striking plate. Preferably, the mortise lock is positioned in a door leaf wherein the striking plate is positioned in a door frame. In order to keep the door closed or to lock the door, the bolt is introduced into the striking plate.

[0009] Preferably, the bolt is adapted to be moved between different positions, namely a locking position of the bolt and a door-closed position of the bolt. In the locking position, the bolt protrudes more from a housing of the mortise lock than in a door-closed position without locking. Preferably the bolt can also be moved to a retracted position. In the retracted position the bolt does not interfere with the striking plate. Especially, the bolt is retracted into the housing of the mortise lock in the retracted position. The door-closed position is preferably placed between the locking position and the retracted position. Especially, the door is unlocked when the bolt is in the door-closed position and/or the door is locked in the locking position. Therefore, the locking position of the bolt can also be named dead lock position of the bolt.

[0010] The bolt comprises a main body including a connecting part adapted to be coupled with a driving element of the mortise lock. The driving element particularly is a door handle or a key cylinder. Particularly, the driving element allows movement of the bolt. The bolt further comprises a tension adjuster plate provided on an outer surface of the main body. The tension adjuster plate is linearly slidable along the outer surface of the main body.

[0011] The bolt can get into contact with the striking plate in order to keep the door in a closed but unlocked state. Particularly, the tension adjuster plate is pressed to the striking plate because of a door sealing. In case the door shall be locked, the main body, which is the driven part of the bolt, can be moved with respect to the tension adjuster plate thereby reducing friction. Particularly, an operator of the door does not have to overcome high friction when moving the bolt relative to the striking plate. Further, the tension adjuster plate can maintain a holding function for holding the door leaf in the closed and sealed position.

[0012] Preferably, the tension adjuster plate is adapted to move along the operation direction of the bolt. That means, the tension adjuster plate is adapted to move in and/or against the operation direction of the bolt. The operation direction of the bolt is defined as the direction in which the bolt protrudes from the housing of the mortise lock. While being able to move against the operation direction of the bolt, the tension adjuster plate can stay behind, when the main body moves in the operation direction. Thereby the friction between the bolt and the striking plate is lowered.

[0013] The operation direction of the bolt can be horizontal when the lock is mounted in the door. The bolt can be built as a dead bolt, a latch bolt or as a latching dead bolt. The striking plate can be supposed to be arranged in the door frame facing the lock.

[0014] Alternatively, the operation direction of the bolt can be vertical when the lock is mounted in the door. Thereby, the bolt can be built as a locking rod. The striking plate can be supposed to be arranged in the frame above the lock or in the floor.

[0015] Preferably, at least one pin barring is provided between the main body and the tension adjuster plate. Therefore, the tension adjuster plate can be used as a contact element for contacting the striking plate while maintaining the ability of relative movement between tension adjuster plate and main body. Particularly, the bolt allows a relative movement between the tension adjuster plate and the main body in the operation direction of the bolt.

[0016] The pin barring preferably includes a spring el-

ement. The spring element is adapted to exert a force between the main body and the tension adjuster plate. Said force preferably is between 100 N and 200 N, particularly between 120 N and 180 N. Thus, the tension adjuster plate is hardly movable in the direction of the spring force, which particularly corresponds to the door leaf opening direction but is movable in the direction perpendicular to the spring force, which particularly corresponds to the bolt operation direction. Thereby, the sealing function of the door can be maintained.

[0017] The pin barring further preferably includes a ball element. The ball element is in sliding contact with the tension adjuster plate. The ball element allows a smooth movement of the tension adjuster plate with respect to the main body, while the ball element acts as rolling or sliding body.

[0018] The main body can bear the pin barring. The main body can comprise a reception for the pin barring.

[0019] Preferably, the bolt comprises several pin barrings. Especially, the pin barrings are positioned along the sliding direction of the tension adjuster plate. The main body can bear the several pin barrings. The main body can comprise a reception for each pin barring. Each pin barring can comprise a spring element and/or a ball element. The spring element of each pin barring can be designed as described above. Especially, the spring elements can have the same spring force. The ball element of each pin barring can be designed as described above.

[0020] In a preferred embodiment, the main body includes a front surface and a slanted surface slanted with respect to the outer surface. The front surface and the slanted surface are provided on a side of the main body opposite to the outer surface. Preferably, the outer surface is a largest surface of the main body. The slanted surface allows closing the door leaf without actuating a door handle or the like, i.e. without actively moving the bolt. Particularly, the door leaf is closed by pushing the bolt against the striking plate, wherein the slanted surface of the bolt touches the striking plate. Due to the slanting, the slanted surface causes the bolt moving in a direction perpendicular to the door leaf closing direction such that the bolt is at least partly retracted into the mortise lock body. A spring or the like pushes the bolt back out as soon as the slanted surface gets out of contact of the striking plate. The striking plate then contacts the tension adjuster plate, which holds the door leaf firmly in a closed position. In order to open the door, the bolt has to be actively retracted into the retracted position, for example by operating a door handle. Due to the movability of the main body with respect to the tension adjuster plate, the effects of a high friction between the tension adjuster plate and the striking plate are reduced when moving the bolt to a protruding state, in which the bolt further protrudes from the mortise lock body than in the retracted position. The protruding state can be the door-closed position and/or the locking position of the bolt.

[0021] Especially, the friction is reduced by moving the bolt from the door-closed position to the locking position.

[0022] Preferably, the main body comprises rail parts for guiding movement of the tension adjuster plate. Said rail parts preferably allow movement of the tension adjuster plate along a largest dimension of the main body. Said rail parts preferably allow movement of the tension adjuster plate along (i. e. in and/or against) the operation direction. This particularly limits the friction of the striking plate while an operation movement of the bolt. Particularly, the bolt can be retracted to or pushed out from the mortise lock body. The respective movement is linearly and is executed along the operation direction. The tension adjuster plate is only moveable along the operation direction such that the tension adjuster plate supports moving the bolt to a locked state but does not deteriorate the holding function of the bolt.

[0023] The rail parts and the rest of the main body can be built in one-piece.

[0024] The tension adjuster plate can be unmovable in an upper and lower direction of the lock in a mounted state. The rail parts can limit the movability of the tension adjuster plate in the upper and the lower direction if the lock is mounted in a door.

[0025] A gap preferably remains between the tension adjuster plate and the main body. Thus, the friction between main body and tension adjuster plate is removed. The gap is particularly created via the above described pin barring. The gap is preferably between 0.5 mm and 1.5 mm, preferably 1.0 mm.

[0026] The tension adjuster plate can be supported to move perpendicular to the operation direction of the bolt. For that reason, the rail parts can have a larger depth than the tension adjuster plate. The perpendicular direction can be the opening and/or closing direction of the door. The perpendicular direction can be perpendicular to a height of the lock. The perpendicular direction can be perpendicular to the upper direction of the lock. The perpendicular direction means that the tension adjuster plate can be recessed with regards to the main body.

[0027] The tension adjuster plate is particularly movable to protrude at most 2.0 mm, preferably 1.5 mm, from the main body. Additionally or alternatively, the tension adjuster plate is movable to be recessed at most 1.0 mm, preferably 0.5 mm, with respect to the main body. Therefore, the tension adjuster plate allows sufficient movement of the main body while being firmly held to the main body such that the bolt reliably holds a door leaf in a closed position.

[0028] The tension adjuster plate can be adopted to stay behind when the main body moves from the door-closed position to the locking position. Therefore, the tension adjuster plate helps to lower the friction when the highest friction occurs.

[0029] The coefficient of friction of the tension adjuster plate can be larger than the coefficient of friction of the main body. Especially the coefficient of friction of the tension adjuster plate with regards to steel can be larger than the coefficient of friction of the main body with regards to steel. Especially the coefficient of friction of the

tension adjuster plate with regards to the striking plate can be larger than the coefficient of friction of the main body with regards to the striking plate. Especially the coefficient of friction of the tension adjuster plate can be larger than the coefficient of friction of the main body with regards to the same reference material. For example, the tension adjuster plate can be made out of stainless steel. The main body can be made out of steel.

[0030] The main body can comprise an abutment for stopping the tension adjuster plate to move further in the operation direction.

[0031] The main body, especially the rail parts, can be formed openly at a rear end of the main body in order to allow the movement of the tension adjuster plate along the outer surface of the main body, especially against the operation direction.

[0032] The invention further regards a mortise lock. The mortise lock comprises a bolt as described above.

[0033] The mortise lock can comprise a housing.

[0034] The mortise lock can further comprise a driving element connected to the connecting part of the main body of the bolt. The driving element includes a first receiving portion for receiving a key cylinder and/or a second receiving portion for receiving a door handle. The driving element therefore allows an operator of the mortise lock to move the bolt, particularly via a handle or a key. The bolt is slidable along a sliding direction due to a driving force of the driving element. Any movement along sliding direction corresponds to the above described operation direction. The mortise lock is particularly provided within a door leaf, wherein the bolt is movable to protrude from or to be recessed with respect to the door leaf.

[0035] In a preferred embodiment, the tension adjuster plate is slidable with respect to the main body along the sliding direction. Hence, the tension adjuster plate can support movement of the main body in case the bolt is in contact with the striking plate. Said contact is reached via the tension adjuster plate such that high frictional forces occur between the tension adjuster plate and the striking plate. However, the influence of the friction between the tension adjuster plate and the striking plate is eliminated or at least reduced due to the relative movement between main body and tension adjuster plate.

[0036] Preferably, the housing comprises a stopping member for stopping the movement of the tension adjustment plate. Thereby, the sliding movement of the tension adjuster plate is limited.

[0037] An embodiment of the invention will now be described with reference to the attached drawings. In the drawings

Fig. 1 is a first schematic view of a bolt according to an embodiment of the invention,

Fig. 2 is a second schematic view of the bolt according to the embodiment of the invention,

Fig. 3 is a schematic view of a mortise lock according to an embodiment of the invention in an unlocked state, and

Fig. 4 is a schematic view of the mortise lock according to the embodiment of the invention in a locked state.

[0038] Figures 1 and 2 show different views of a bolt 1 according to a preferred embodiment of the invention. Figure 1 particularly is a sectional view from the top while figure 2 particularly is a flat side view. The bolt 1 can be used with a mortise lock 2 as shown in figures 3 and 4.

[0039] The bolt 1 comprises a main body 4 and a tension adjuster plate 7. The main body 4 includes a connecting part 5 which can be coupled with a driving element 6 (cf. figures 3 and 4) of the mortise lock 6. This will be described afterwards with respect to figures 3 and 4. Due to the connecting part 5, the main body 4 can be actively moved.

[0040] The tension adjuster plate 7 is provided slidably on an outer surface 8 of the main body 4. The tension adjuster plate 7 is slidable along an operation direction of the bolt 1. This is the direction from the left to the right and vice versa in Figure 1 and 2. The direction from the right to the left is called "in operation direction" and the direction from the left to right is called "against the operation direction".

[0041] The outer surface 8 is provided on an opposite side of the main body 4 compared to a slanted surface 12 and a front surface 13. Particularly, the outer surface 8 is a largest surface of the main body 4.

[0042] When the bolt 1 is used within a door leaf and the bolt 1 is pushed to a striking plate 3 provided within a door frame, the slanted surface 12 is the first face getting into contact with the striking plate 3. This causes the bolt 1 shifting in a direction parallel to the outer surface 8, namely against the operation direction. The tension adjuster plate 7 is shifted away from the striking plate 3. Thus, the bolt 1 is pushed into a housing of the lock 2. As soon as the bolt 1 is shifted as far as the slanted surface 12 allows and the door is closed, a spring pushes the bolt 1 back to its original position, but within a reception of the striking plate 3. Hence, the bolt 1 maintains contact with the striking plate 3 but the face in contact with the striking plate 3 changes.

[0043] Particularly, in a state in which the door leaf is closed, the tension adjuster plate 7 is in contact with the striking plate 3 as shown in figure 1. There usually is increased friction between the tension adjuster plate 7 and the striking plate 3 since the door leaf is usually sealed against the door frame via a sealing element, which pushes the door leaf along a door opening direction thereby pushing the tension adjuster plate 7 against the striking plate 3.

[0044] In order to allow a relative movement of the main body 4 and the tension adjuster plate 7 in a direction perpendicular to the outer surface 8, several pin barrings

9 are provided. The pin barrings 9 enables a relative movement of the main body 4 and the tension adjuster plate 7 with low friction. Each pin barring 9 includes a spring element 10 and a ball element 11, wherein the spring element 10 pushes the ball element 11 onto the tension adjuster plate 7. Thus, a force is executed between the main body 4 and the tension adjuster plate 7 which preferably is within 100 N and 200 N, particularly 150 N. In this way, a gap 15 between 0.5 mm and 1.5 mm, preferably of 1.0 mm, remains between the main body 7 and the tension adjuster plate 7. The tension adjuster plate 7 is pushed away from the main body by the spring force. Due to the high spring force, the bolt 1 with the tension adjuster plate 7 can still provide a sealing function for the door.

[0045] When the tension adjuster plate 7 is pushed to the striking plate 3, any relative movement between the main body 4 and the striking plate 3 perpendicular to the outer surface 8 is limited. At the same time, the tension adjuster plate 7 is slidable in parallel to the outer surface 8. In this regard, the main body 4 comprises rail parts 14 for guiding a movement of the tension adjuster plate 7. Due to the rail parts 14, the tension adjuster plate 7 is linearly moveable with respect to the main body 4 in a direction which is the same direction the bolt 1 is moveable with respect to the mortise lock 2, namely along the operation direction.

[0046] The rail parts 14 prohibit a movement of the tension adjuster plate 7 in an upper and a lower direction perpendicular to the operation direction. The upper and the lower direction correspond to the upper and lower direction in Figure 2.

[0047] An abutment is placed between the slanted surface 12 and the tension adjuster plate 7 so that the movement of the tension adjuster plate 7 in the operation direction is stopped. On the opposite side of the tension adjuster plate 7, an abutment is missing. At this rear end of the main body 4, the rail parts 14 are formed openly in order to let the tension adjuster plate 7 move along the operation direction.

[0048] The advantages of this relative movability is described with respect to figures 3 and 4. These figures are schematic views of a mortise lock 2 according to an embodiment of the invention. The mortise lock 2 can be used within a door leaf and comprises a bolt 1 as described above. The bolt 1 can be used for keeping the door leaf closed without locking and for locking the door leaf. Figure 3 shows a state without locking, in which the bolt 1 is in a door-closed position and protrudes e. g. about 14 mm from a end plate 18 of the mortise lock 1. When the bolt is in the door-closed position, the slanted surface 12 is positioned in the striking plate 3, while the front surface 13 might be outside the striking plate 13.

[0049] Figure 4 shows the mortise lock 1 in a locked state, in which the bolt is moved to a locking position. In the locking position, the bolt 1 protrudes e. g. from the end plate 18 about 22 mm in order to meet security grade 5 in EN 12209. When the bolt is in the locking position, the front surface 13 is positioned in the striking plate 3.

[0050] As explained above, there might be high friction between the striking plate 3 and the bolt 1. Due to the tension adjuster plate 7, said friction occurs between the striking plate 3 and the tension adjuster plate 7. When the main body 4 is driven to the locking position, the main body 4 slides with respect to the tension adjuster plate 7 thereby eliminating or at least reducing the influence of the presence of the striking plate 3. The tension adjuster plate 7 stays behind, as shown in Figure 4 in comparison to Figure 3.

[0051] As shown in figures 3 and 4, the mortise lock 2 comprises a driving element 6 to move the main body 4 of the bolt 1. The driving element 6 includes a first receiving portion 16 for receiving a key cylinder and a second receiving portion for receiving a door handle. The bolt 1 is therefore moveable via a key, particularly to lock and unlock the door leaf and via a door handle, particularly to operate the door leaf without locking.

[0052] The driving element 6 is coupled with the connecting part 5. Said coupling particularly allows the bolt 1 to be pushed into the mortise lock 2, i.e. into the end plate 18, from an external force. Thereby, the bolt 1 is positioned in a retracted position. As soon as the external force no longer acts, a spring pushes the bolt 1 out again into the position shown in figure 3. Bringing the bolt 1 into the locking position as shown in figure 4, an operator has to use a key to operate the key cylinder provided at the first receiving portion 16.

[0053] When high frictional forces apply between the striking plate 3 and the tension adjuster plate 7, the main body 4 can be moved to the locking position without moving the tension adjuster plate 7. Therefore, it is ensured that the main body 4 can always be moved in a smooth fashion.

[0054] The tension adjuster plate 7 particularly is moveable such that a distance X between an end face of the tension adjuster plate 7 and an end face of the main body 4 remains within a range from 2.0 mm, preferably 1.5 mm, to - 1.0 mm, preferably - 0.5 mm. This means that the tension adjuster plate 7 is movable to protrude at most 2.0 mm, preferably 1.5 mm, from the main body 4 and to be recessed at most 1.0 mm, preferably 0.5 mm, with respect to the main body 4.

[0055] The tension adjuster plate 7 stays behind when the main body 4 moves from the door-closed position, as shown in Figure 3, into the locking position, as shown in Figure 4.

[0056] In order to achieve that the tension adjuster plate 7 stays behind, the coefficient of friction of the tension adjuster plate 7 is larger than the coefficient of friction of the main body 4 with regards to the striking plate 3. E. g. the striking plate 3 can made out of steel.

[0057] The housing of the lock can comprise a stopping member (not shown) in order to stop the movement of the tension adjuster plate 7 against the operation direction.

Reference signs

[0058]

1	bolt
2	mortise lock
3	striking plate
4	main body
5	connecting part
6	driving element
7	tension adjuster plate
8	outer surface
9	pin barring
10	spring element
11	ball element
12	slanted surface
13	front surface
14	rail part
15	gap
16	first receiving portion
17	second receiving portion
18	end plate

Claims

1. Bolt (1) for a mortise lock (2), the bolt (1) being adapted to be introduced into a striking plate (3) and comprising:

- a main body (4) including a connecting part (5) adapted to be coupled with a driving element (6) of the mortise lock (2), and
- a tension adjuster plate (7) provided on an outer surface (8) of the main body (4),
- wherein the tension adjuster plate (7) is linearly slidable along the outer surface (8) of the main body (4).

2. Bolt (1) according to claim 1, **characterized in that** at least one pin barring (9) is provided between the main body (4) and the tension adjuster plate (7).

3. Bolt (1) according to claim 2, **characterized in that** the pin barring (9) includes a spring element (10) exerting a force between the main body (4) and the tension adjuster plate (7), wherein said force preferably is between 100 N and 200 N, particularly between 120 N and 180 N.

4. Bolt (1) according to claim 2 or 3, **characterized in that** the pin barring (9) includes a ball element (11) being in sliding contact with the tension adjuster plate (7).

5. Bolt (1) according to any one of the previous claims **characterized in that** the main body (4) includes a front surface (13) and a slanted surface (12) slanted with respect to the outer surface (8), wherein the front surface (13) and the slanted surface (12) are provided on a side of the main body (4) opposite to the outer surface (8), and wherein the outer surface (8) is preferably a largest surface of the main body (4).

6. Bolt (1) according to any one of the previous claims **characterized in that** the main body (4) comprises rail parts (14) for guiding movement of the tension adjuster plate (7), wherein the rail parts (14) preferably allow movement of the tension adjuster plate (7) along a largest dimension of the main body (4).

7. Bolt (1) according to any one of the previous claims **characterized in that** a gap (15) remains between the tension adjuster plate (7) and the main body (4), wherein said gap is preferably between 0.5 mm and 1.5 mm.

8. Bolt (1) according to any one of the previous claims **characterized in that** the tension adjuster plate (7) is supported to move perpendicular to an operation direction of the bolt (1), especially that the rail parts (14) have a larger depth than the tension adjuster plate (7).

9. Bolt (1) according to any one of the previous claims **characterized in that** the tension adjuster plate (7) is movable to protrude at most 2.0 mm, preferably 1.5 mm, from the main body (4) and/or to be recessed at most 1.0 mm, preferably 0.5 mm, with respect to the main body (4).

10. Bolt (1) according to any one of the previous claims **characterized in that** the bolt is adapted to be movable between a retracted position, a door-closed position and a locking position wherein the tension adjuster plate (7) is adapted to stay behind when the main body (4) moves from the door-closed position into the locking position.

11. Bolt (1) according to any one of the previous claims **characterized in that** coefficient of friction of the tension adjuster plate (7) is larger than the coefficient of friction of the main body (4).

12. Bolt (1) according to any one of the previous claims **characterized in that** the main body (4) comprises an abutment for stopping the tension adjuster plate (7) to move further in the operation direction and/or the main body (4), especially the rail parts (14), are formed openly at a rear end of the main body (4) in order to allow the movement of the tension adjuster plate (7) along the outer surface of the main body (4).

13. Mortise lock (2) comprising a bolt (1) according to any one of the previous claims.

14. Mortise lock (2) according to claim 13 **characterized in that** the mortise lock 82) comprises a driving element (6) connected to the connecting part (5) of the main body (4) of the bolt (1), wherein the driving element (6) includes a first receiving portion (16) for receiving a key cylinder and/or a second receiving portion (17) for receiving a door handle, and wherein the bolt (1) is slidable along a sliding direction due to a driving force of the driving element (6).

15. Mortise lock (2) according to claim 13 or 14, **characterized in that** the tension adjuster plate (7) is slidable with respect to the main body (4) along the sliding direction.

Fig. 1

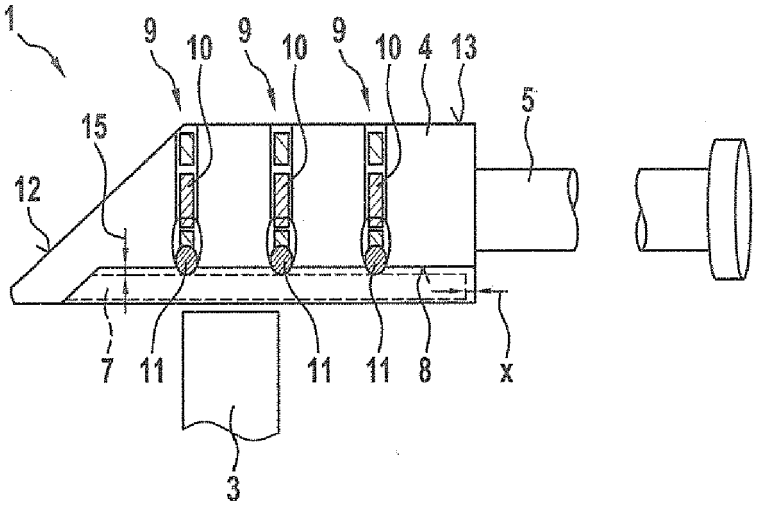


Fig. 2

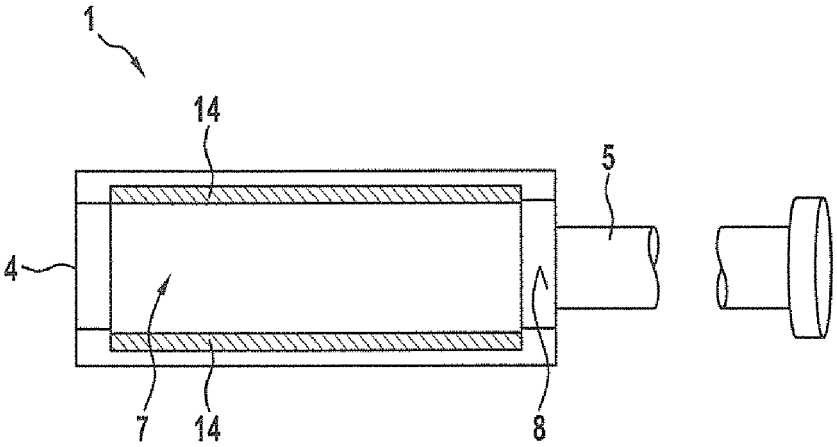


Fig. 3

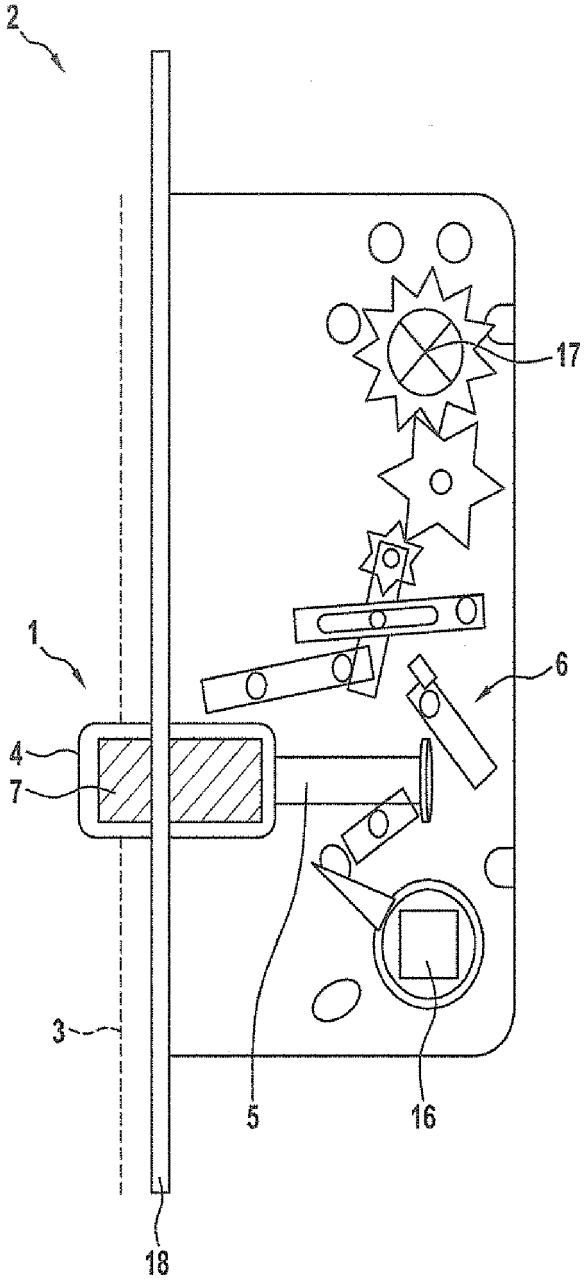
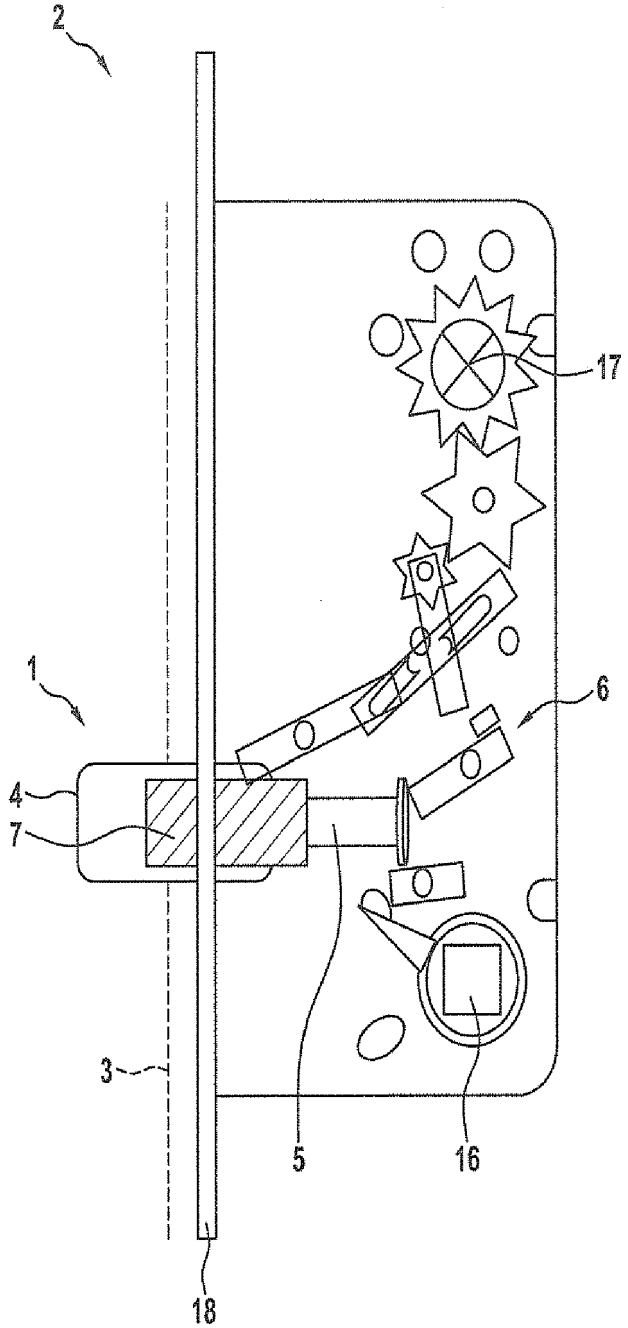


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 19 17 2071

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 20 2013 009210 U1 (KFV KARL FLIETHER GMBH & CO KG) 6 November 2013 (2013-11-06) * figures 8-13 *	1	INV. E05B15/10
A	DE 10 2014 102041 A1 (ASSA ABLOY SICHERHEITSTECHNIK) 20 August 2015 (2015-08-20) * figures *	1	
A	EP 1 624 140 A2 (ROTO FRANK AG) 8 February 2006 (2006-02-08) * figures *	1	

TECHNICAL FIELDS SEARCHED (IPC)

E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 September 2019	Van Beurden, Jason

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 17 2071

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17-09-2019

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