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(54) DEAD BOLT LOCKING MECHANISM

RIEGELSCHLOSSVERRIEGELUNGSMECHANISMUS

MÉCANISME DE VERROUILLAGE À PÊNE DORMANT

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Description

[0001] The invention regards a dead bolt locking mechanism. Further, the invention regards door lock including such a dead bolt locking system.

[0002] From the prior art, dead bolt locking systems are known. Such locking systems allow actuating a dead bolt particularly for securing an entrance door. A dead bolt is especially a bolt which can only be moved due to actuating via the dead bolt locking systems. Therefore, a dead bolt can be particularly different from a spring bolt in that the dead bolt cannot be moved by external force acting directly on the dead bolt.

[0003] The dead bolt locking mechanism is preferably used to further secure a door in addition to the spring bolt. Additionally, split followers are known which are employed to actuate the dead bolt from two different sides of a door. Particularly, on the one side, a key cylinder for actuating the dead bolt with a key can be provided, while on the other side a thumb turn which allows actuating the dead bolt without a key might be provided. The split followers must be provided such that the key cylinder and at the thumb turn do not block each other.

[0004] However, in case a thumb turn is coupled to one of the followers, the respective follower has no defined position. Particularly, the follower can be at any position after using the thumb turn. Therefore, there is the risk that the follower of the thumb turn interferes with the follower of the key cylinder, which causes blocking of the whole system. Especially, the unlocking of the dead bolt by using the key is blocked.

[0005] Document GB 1 487 567 A discloses a spring which holds a follower with a recess in a predefined position.

[0006] It is an object underlying the present invention to provide a dead bolt locking system which is simple and cost-saving to manufacture and which allows safe and secure operation of a dead bolt.

[0007] The solution of this object is achieved by the independent claim. The dependent claims contain advantageous embodiments of the present invention.

[0008] The object is therefore solved by a dead bolt locking mechanism comprising an operation rack, a first follower, a second follower, and an engaging element. The operation rack is movable only along a predefined displacement direction and is connectable to a dead bolt. Therefore, the operation rack can be the only item which allows moving of the dead bolt when the dead bolt locking mechanism is employed in a lock. The first follower and the second follower are rotatable about a rotation axis. The rotation axis can be the same for the followers or can be different rotations axes. Particularly, the first follower and the second follower can be connected to any user interface which shall allow moving the dead bolt.

[0009] Further, the first follower and the second follower are adapted to independently move the operation rack along the displacement direction. Each of the first follower and the second follower can move the operation rack

along the displacement direction. Preferably that means that the first follower is usually not rotated by the rotation of the second follower and/or the second follower is usually not rotated by the rotation of the first follower. Only in the exceptional case where both followers are in effective connection with the rack, one of the followers can be rotated by the other follower. The first follower and the second follower can be connected to different user interfaces to independently move the operation rack.

[0010] The first follower and/or the second follower comprise at least one counterelement, preferably a cut-out, with which the engaging element is engageable to situate the respective first follower and/or second follower in a non-blocking position. Holding the first follower and/or second follower in non-blocking positions, respectively, allows avoiding interference of the first follower and the second follower, such that the first follower and the second follower do not block each other. This allows moving the dead bolt via a user interface connected to the one follower, while the user interface connected to the other follower is not affected. In a preferred embodiment, the non-blocking positions are selected such that a position of the first follower and second follower is avoided, in which the first follower and the second follower might possibly prohibit the movement of the operation rack.

[0011] A non-blocking position particularly is a position in which the follower with the counterelement does not prohibit or block the movement of the operation rack. An Engagement of the counterelement and the engaging element leads to the first follower and/or the second follower being situated or rested in the non-blocking position. The counterelement is engageable with the engaging element preferably via frictional connection and/or via form closure.

[0012] A blocking position particularly is a position in which one of the followers block the movement of the other follower so that the other follower cannot move the operation rack. The follower can be moved from a blocking position to an unblocking position and vice versa by rotation of the follower.

[0013] Preferably, it is possible to disengage the engaging element and the counterelement by the manual force of a user. Therefore, the engagement of the engaging element and the counterelement does not prohibit the user to further use the follower to move the operation rack.

[0014] The dead bolt locking mechanism might comprise one follower with a counterelement and might comprise an engaging element in order to engage with the counterelement, while the other follower might be free of a counterelement and no engaging element is provided for the later follower.

[0015] Especially, a follower which is meant to be connected to a thumb turn is provided with the counterelement. An engaging element is provided for this follower in the dead bolt locking mechanism. A follower which is meant to be connected to a key cylinder can be built free

of the counterelement and no engaging element has to be provided for this follower.

[0016] Alternatively, in the case that each of followers comprise a counterelement, the dead bolt locking mechanism can comprise at least one engaging element for each follower. If a follower comprising the counterelement is mentioned in the following, this follower can be the first and/or the second follower.

[0017] The first follower and the second follower each preferably comprise a circumferential surface which continues around the displacement direction. Especially, the circumferential surface can comprise the counterelement. Preferably, the circumferential surface is a smooth surface without having steps or protrusions except the counterelement.

[0018] The engaging element can be built as a ball.

[0019] The counterelement can be built as a cut out.

[0020] In an advantageous embodiment, the engaging element is pressed to the follower comprising the counterelement by force of an elastic element of the dead bolt locking mechanism. Especially the engaging element is pressed against circumferential surface of the follower comprising the counterelement by force of the elastic element of the dead bolt locking mechanism. The elastic element can be a spring. The engaging element is engageable with the counterelement, preferably the cutout. Further preferred, the engaging element is the ball which is pressed to the respective circumferential surface by force of an elastic element of the dead bolt locking mechanism. Therefore, the follower comprising the counterelement can be moved by overcoming the force which presses the engaging element into the cutout. The dead bolt locking mechanism is hence simple to operate and allows safe holding of the first follower and/or the second follower in the predefined position.

[0021] Preferably, the engaging element is engaged with the counterelement, particularly the cutout, in order to avoid that the follower comprising the counterelement is situated in a blocking position or blocking positions where the follower comprising the counterelement blocks the movement of the operation rack. Preferably, the follower can get into blocking and non-blocking positions by rotation. In particular, the blocking positions correspond to less than 15° preferably less than 7°, more preferably less than 3° of the rotation angles. Therefore, the follower reaches the blocking positions due to rotation. However, due to the engaging element, the followers can be situated in a non-blocking position to keep them away from the blocking position in case rotation of the follower is performed.

[0022] The first follower and/or the second follower comprise at least one counterelement which gives a feedback to the user that the follower is situated in a non-blocking position. Such a feedback preferably comprises a haptic feedback that is generated due to the engaging process of the engaging element and the counterelement. Further, the feedback particularly comprises a resistance against further rotation of the first follower and/or

second follower, wherein said resistance can be overcome by manual force of the user.

[0023] The follower can comprise at least two counterelements. By providing several counterelements in one follower, the chances of engagement of one counterelement with the engaging element are enhanced. Thereby, the security to stay off the blocking positions is increased. At least one engaging element is provided within the dead bolt locking mechanism for engaging the at least two counterelements. Especially, one engaging element engages with one counterelement at one time. Also several engaging elements can be provided.

[0024] At least one counterelement is preferably provided in the first follower and/or the second follower in that way that the blocking position is reached by turning clockwise while disengaging the counterelement from the engaging element and at least one counterelement is provided in the respective follower in that way that the blocking position is reached by turning counter clockwise while disengaging the counterelement from the engaging element. Therefore, the user can get a haptic feedback how to avoid the blocking position by turning the follower comprising the at least two counterelements in a clockwise and in a counter clockwise direction. In other words: starting a rotation of the follower with the counterelements far away from the blocking positions, especially opposite the blocking positions, the rotation will lead to at least one engagement of the engaging element and a counterelement while rotating clockwise as well as while rotating counter clockwise. Especially, by symmetrically dividing the part of the follower corresponding to non blocking positions into two halves, each half might contain at least one counterelement. The part of the follower corresponding to the blocking positions can be framed by at least one counterelement on each side of the part of the follower corresponding to the blocking positions wherein especially the counterelements can be positioned to the part of the follower corresponding to the blocking positions in a symmetrical way. By providing the counterelements symmetrically around the part of the follower corresponding to the blocking positions, the user gets the same haptic feedback of approaching the blocking positions by rotating clockwise and by rotating counter clockwise.

[0025] In a particularly preferred embodiment, at least two counterelements are provided in the follower comprising the counterelements in that way that the blocking position is reached by turning clockwise and/or counter clockwise while disengaging the counterelements from the engaging element. Especially, by symmetrically dividing the part of the follower corresponding to the non blocking positions into two halves, each half might contain at least two counterelements. The part of the follower corresponding to blocking positions can be framed by at least two counterelements on each side of the part of the follower corresponding to blocking positions wherein especially the counterelements can be positioned to the part of the follower corresponding to the blocking posi-

tions in a symmetrical way. By providing at least two counterelements while approaching the blocking positions while rotating clockwise and/or by providing at least two counterelements while approaching the blocking positions while rotating counter clockwise, the security of the dead bolt locking mechanism is enhanced. The rotation can be started opposite the blocking positions.

[0026] According to the invention, the engaging element cooperates with the counterelement so that the first follower and/or the second follower are rotated from a blocking position to a non-blocking position due to engagement of the engaging element and the counterelement. Therefore, the engaging element actively moves away the first follower and/or the second follower from the blocking position. Therefore, the dead bolt locking mechanism reliably avoids that the first follower and/or the second follower maintains in the blocking position.

[0027] The first follower and/or the second follower particularly comprise a guiding contour to guide the first follower and/or the second follower to a non-blocking position. Preferably, the counterelement comprises the guiding contour. This allows the first follower and/or the second follower to be moved away from the blocking position to the non-blocking position. In this way, it is particularly prohibited that the first follower and/or the second follower maintain in the blocking position after having been moved by a user.

[0028] Preferably, the first follower and/or the second follower have a disc shape with a round contour. Therefore, the above mentioned engaging element, particularly the ball, can be simply and reliably be guided over the circumferential surface. Further, the first follower and the second follower are preferably of low thickness such that the dead bolt locking mechanism is of flat shape.

[0029] The first follower and the second follower comprise a connection pattern for connecting to an actuation element, particularly a key cylinder or a thumb turn. In particular, the connection pattern allows transmittal of torque energy to move the operation element and hence the dead bolt. The connection pattern might comprise a straight slot or a cross slot. Due to the connection pattern, the key cylinder and/or the thumb turn can move the operation rack, while the operation rack can move the dead bolt.

[0030] The first follower and the second follower each particularly comprise a cam provided, preferably on a side surface, for moving the operation rack. The blocking position is situated so that the cam of the first follower and/or the second follower blocks the movement of the operation rack by interfering with a protrusion of the operation rack for retracting the dead bolt. Due to such a design, there is the general risk of the first follower and the second follower interfere due to the cams both try to move the operation rack. However, due to the circumferential surface described above, the first follower and the second follower can be held in predefined positions such that positions, in which the cams would interfere, are avoided.

[0031] Further preferred, the first follower and/or the second follower comprising the counterelement are moved from a blocking position to a non-blocking position by the force of the elastic element. Said elastic element preferably acts on the engaging element such that the elastic element presses the engaging element to a circumferential surface of the first follower and/or second follower. Together with a respective guiding contour a movement of the first follower and/or second follower can be generated due to the elastic element pressing the engaging element onto said contour. In this way, the elastic element provides the energy required for movement of the first follower and/or second follower.

[0032] Particularly, the elastic is free of being fixed to the first follower and/or the second follower comprising the counterelement. Especially, this means that the engaging element is movable by the elastic element but is not restricted in movement by the elastic element. Therefore, the follower can always be moved in a clockwise sense e. g. without damaging the elastic element or be restricted in the movement by the elastic element.

[0033] The first follower and/or the second follower comprising the counterelement preferably are movable to a non-blocking position by the guiding contour, whereas the non-blocking position can be reached both by being rotated in a clockwise and a counter clockwise sense. Therefore, it is ensured that the non-blocking position can reliably be reached.

[0034] Further, it is preferred that at least one of the first follower and/or the second follower comprises a first counterelement and a second counterelement. The first counterelement and the second counterelement are counterelements as described above. One of the counterelements is configured to drive the respective follower out of the blocking position in a clockwise sense and the other counterelement is configured to drive the respective follower out of the blocking position in a counter clockwise sense. In this way, the first follower and/or the second follower can be moved away from the blocking position in any case such that it is reliably avoided that the first follower and/or the second follower maintains in the blocking position.

[0035] The first follower and/or the second follower preferably comprise at least one counterelement which is built without a guiding contour. The counter element without guiding contour is simple to manufacture and is mainly provided to stop rotation by haptical feed back and not to move the first follower and/or second follower out of the blocking position. Such counterelement might be preferably placed with a maximum angle offset to the blocking position.

[0036] In a preferred embodiment, the counterelement has a contour which gives the user the same haptical feedback by rotating the follower clockwise and counter-clockwise. Especially, the contour is symmetrical. This can be true for the counterelement with a guiding contour and/or for the counterelement without a guiding contour.

[0037] The dead bolt locking system preferably com-

prises a housing. The housing includes a notch for guiding the operation rack and a bearing surface for bearing the first follower and the second follower. Preferable, the housing comprises a first housing element and a second housing element, wherein the first housing element comprises said notch and a bearing surface for the first follower, while the second housing element comprises a bearing surface for the second follower. The housing further preferably has openings for access to the above described connection patterns of the first follower and second follower.

[0038] The elastic element can be fixed to and/or guided in the housing.

[0039] The operation rack preferably is a gear rack. The gear rack includes several teeth for engaging with a dead bolt moving gear. Therefore, a gear ratio can be provided to adapt the force and/or the displacement caused by the first follower and/or the second follower. The dead bolt moving gear might be part of the dead bolt locking mechanism or might be part of the dead bolt itself.

[0040] The invention further comprises a door lock comprising a dead bolt locking mechanism as described above. The door lock might further comprise a spring cylinder lock which is accessible by a door handle. The dead lock on the other side can only be moved by the dead bolt locking mechanism as described above.

[0041] The first follower is preferably connected to key cylinder and the second follower is connected to a thumb turn. Particularly, the thumb turn is provided on an inner side of the door lock and the key cylinder is provided on the outer side of the door lock, wherein the inner side and the outer side are such sides of a door equipped with the first follower. Especially, the follower connected to the thumb turn is built with at least one counterelement as it is described above according to the inventive dead bolt mechanism. The follower connected to the key cylinder may be built without a counterelement.

[0042] The door lock preferably is operateable by manual forces applied by a user. Particularly, the door lock is free of any electrical or electromechanical components. Therefore, no dedicated energy supply is necessary.

[0043] Specific embodiments are described with reference to the attached drawings. In the drawings

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

Fig. 2 is a schematic view of a follower of the dead bolt locking mechanism,

Fig. 3 is a schematic view of a housing of the dead bolt locking mechanism according to the embodiment of the invention,

Fig. 4 is a schematic view of a door lock comprising the dead bolt locking mechanism according to

the embodiment of the invention,

Fig. 5 is a schematic view of a first alternative follower of the dead bolt locking mechanism according to the embodiment of the invention,

Fig. 6 is a schematic view of a second alternative follower of the dead bolt locking mechanism according to the embodiment of the invention.

[0044] Fig. 1 is a schematic view of the dead bolt locking mechanism 1 according to an embodiment of the invention. The bolt locking mechanism 1 comprises an operation rack 5 that is movable only along a displacement direction 100. To ensure, the operation rack 5 is only movable along the displacement direction 100, a notch 20 is provided within a first housing element 21, in which the operation rack 5 is guided. The operation rack 5 is a gear rack comprising teeth 24 which are engageable with a dead bolt moving gear which allows moving of a dead bolt.

[0045] The operation rack 5 can be moved along the displacement direction 100 via a first follower 3 or a second follower 4. The first follower 3 and the second follower 4 are both formed in a disc-like shape and have a round contour. Further, the first follower 3 and the second follower 4 are both rotatable about a rotation axis 200. The rotation axis 200 preferably is orientated perpendicular to the displacement axis 100. Therefore, a circumferential surface 7 of the first follower 3 and the second follower 4 continues around the rotation axis 200.

[0046] Both, the first follower 3 and the second follower 4 comprise a cam 16, which is adapted to engage with the operation rack 5. Therefore, the operation rack 5 can be moved by rotating the first follower 3 and the second follower 4 such that the cam 16 displaces the operation rack 5. The cam 16 is provided on a side surface 17 of the first follower 3 and the second follower 4. Preferably, the side surfaces 17 of the first follower 3 and the second follower 4 face each other and are separated by the operation rack 5.

[0047] Such a design allows moving the operation rack 5 with either the first follower 3 or the second follower 4 independently. This means that blocking one of the first follower 3 and the second follower 4 does not prevent rotation of the other one of the first follower 3 and the second follower 4. However, there might be a situation in which the first follower 3 is rotated into a position in which the cam 16 of the first follower 3 blocks movement of the operation rack 5 generated by the second follower 4. Therefore, there is the risk that the first follower 3 and the second follower 4 block each other in a specific orientation. This is true if the cam 16 engages the upper protrusion in Figure 1 of the operation rack 5. The upper protrusion in Figure 1 serves to retract the dead bolt. Since the thumb turn has no predefined position as the key cylinder, the follower 3 connected to the thumb turn can accidentally be in this position. Therefore, there is a

special risk for the first follower 3 to block the second follower 4. Since the positions of the second follower 4 connected to the key cylinder are well defined, there is less or no danger that the second follower 4 blocks the first follower 3.

[0048] The circumferential surface 7 of the first follower 3 and the second follower 4 comprise four cutouts 9. The cutouts serve as counterelements. These cutouts 9 extend from the circumferential surface 7 to the rotation axis 200. Further, a holding element 10 is provided for each of the first follower 3 and the second follower 4 (not shown in Figure 1). A holding element 10 and the respective holding functionality is shown in figure 2.

[0049] Figure 2 is a schematic view of a part of a dead bolt locking mechanism 1 not belonging to the claimed invention showing a first follower 3 or second follower 4 together with the holding element 10. It has to be noted that the first follower 3 and the second follower 4 are identical in a one embodiment of the invention. Therefore, figure 2 may show the first follower 3 and the second follower 4. In another preferred embodiment not shown, only the first follower 3 which is due to be connected to a thumb turn comprises the cutouts 9 and cooperates with a holding element 10. The second follower 4 does not comprise a cutout 9.

[0050] As can be seen from figure 2, the holding element 10 comprises an engaging element 11, which is pressed onto the circumferential surface 7 with force of an elastic element 12. The engaging element 11 preferably is a ball which allows smooth relative motion between the engaging element 11 and the circumferential surface 7. In case the engaging element 11 engages with one of the cutouts 9, the respective first follower 3 and second follower 4 are stabilized in the position defined by the cutout 9. An extra torque provided by the user has to be applied to the respective first follower 3 and second follower 4 in order to disengage the holding element 11 and the cutout 9. The elastic element 12 can be arranged within a specific area of the dead bolt locking mechanism 1. The elastic element 12 can be guided within the dead bolt locking mechanism 1.

[0051] Hence, the cutouts 9 and the holding elements 10 allow stabilizing the first follower 3 and the second follower 4 in a predefined non blocking position. This avoids the first follower 3 and/or the second follower 4 being in an undefined position. Particularly, the above described specific position of the first follower 3 and/or the second follower 4, in which one of the cams 16 block the other cam 16 by blocking movement of the operation rack 5, can be avoided by the cutouts 9 and the holding element 10 for the follower being in danger to block the other follower.

[0052] As can further be seen from figure 2, the first follower 3 and the second follower 4 both have a connection pattern 13 which allows connecting the respective first follower 3 and second follower 4 with any user interface which allows a user to operate the dead bolt locking mechanism 1. The connection pattern 13 prefer-

ably is realized by a cutout of the side surface 17 and is optimized for transmitting torque between the user interface and the respective first follower 3 and second follower 4. In the embodiment shown in figures 1 to 4, the connection pattern 13 has the shape of a cross. Further, the connection pattern 13 may comprise an indication element 26 indicating a position of the cam 16. For example, the indication element 26 forms an arrow as shown in figure 2 or 3, which points away from the cam 16.

[0053] Figure 3 is a schematic view of a housing 18 of the dead bolt locking mechanism 1 according to the embodiment of the invention. The housing 18 comprises a first housing element 21 and a second housing element 22. The first housing element 21 and the second housing element 22 can be connected to each other to house the first follower 3, the second follower 4, and the operation rack 5. The first housing element 21 comprises the above mentioned notch 20 for guiding the operation rack 5. The notch 20 might further define end stops to limit the displacement of the operation rack 5. Especially, the end of the elastic element 12 opposite the engaging element 11 can be fixed to the housing 18.

[0054] The first housing element 21 and the second housing element 22 both comprise a bearing surface 8 for bearing one of the first follower 3 and the second follower 4. Additionally, the first housing element 21 and the second housing element 22 comprise a through hole 25, in which the holding element 10 is provided. The through hole 25 therefore allows access to the circumferential surface 7 of the first follower 3 or second follower 4. The first housing element 21 and the second housing element 22 further allow access to the connection patterns 13 of the first follower 3 and the second follower 4.

[0055] Figure 4 discloses a door lock 2 comprising the above described dead bolt locking mechanism 1. The door lock 2 comprises a dead bolt 6, which allows locking a door by sliding out of the door lock 2. Retracting the dead lock 6 allows unlocking the door.

[0056] In order to operate the dead bolt 6, the dead bolt locking mechanism 1 is provided, while the dead bolt 6 is coupled to the operation rack 5. Preferably, a gear mechanism for moving the dead bolt 6 is provided within the door lock 2, wherein the teeth 24 of the operation rack 5 engage with said gear mechanism.

[0057] Further, a key cylinder 14 is coupled to the second follower 4, while a thumb turn 15 is coupled to the first follower 3. The thumb turn 15 allows actuating the dead bolt 6 via the dead bolt locking mechanism 1 without using a key. Since the first follower 3 is held by the holding element 10 in four predefined positions, it is avoided that the first follower 3 maintains in a position in which the cam 16 of the first follower 3 blocks the operation rack 5 and therefore blocks the second follower 4 and the key cylinder 14. As can be seen, coupling between the first follower 3 and the thumb turn 15 as well as coupling between the second follower 4 and the key cylinder 14 is established via the respective connection pattern 13.

[0058] The door lock 2 may further comprise a spring

lock bolt 19 which can either be retracted into the door lock 2 by operation of a door handle 23 or by a force acting on the spring lock bolt 19. Therefore, the spring lock bolt 19 differs from the dead lock 6 in that the dead bolt 6 can only be moved via the dead bolt locking mechanism 1, while the spring lock bolt 19 can also be moved via an external force.

[0059] In figures 1 to 3, the cutouts 9 are mainly a mental and haptical stop in order to stop the user from turning the first follower 3 and/or the second follower 4 into the blocking positions. The blocking positions are reached when a circumferential part of the follower 3, 4 which is located at a small range of angles of 88° to 92° in Figure 2 e. g. (i. e. "3 o'clock part" in Figure 2 where the tip of the indication element 26 points to) is turned by 90° counterclockwise so that that circumferential part is in touch with the engaging element 11. Therefore, Figure 2 shows a non blocking position of the follower 3, 4.

[0060] The blocking positions are framed by several cut outs 9 on each side of that circumferential part. Starting from a non blocking position opposite the blocking position where a circumferential point of the follower 3, 4 at the angle of 270° in Figure 2 (9 o'clock point, where the tip of cam 16 points to) is in touch with the engaging element 11, the user turns the follower 3, 4. During this rotation, the engaging element 11 will engage with two cut outs 9 on the way to the blocking positions by turning clockwise and two other cut outs 9 on the way to the blocking position by turning counter clockwise. The cut outs 9 are arranged symmetrically around the blocking position. Also the cut outs 9 themselves are symmetrical.

[0061] Figures 5 and 6 are schematic views of a first follower 3 or second follower 4 according to an alternative embodiment.

[0062] Figure 5 is a schematic view of a follower 3, 4 according to a first embodiment. In this embodiment, at least two cutouts 9 comprise a dedicated guiding contour 27 that guides the engaging element 11 out of a blocking position into a non blocking position. Particularly, the guiding contour 27 has the shape of an arc, such that the engaging element 11 is lead to a deepest point of the guiding contour 27. The blocking positions cover a larger range of angles in this embodiment. The blocking positions are all positions wherein the engaging element 11 touches the circumferential part of the follower 3, 4 between the arrows of the two reference numbers 27 in Figure 5. Therefore, Figure 5 shows the follower 3, 4 in a blocking position. The guiding contour 27 corresponds to half of the surface of each of the two cut outs 9 leading away from the blocking positions, i. e. lower part of the upper cut out 9 and upper part of the lower cut out 9.

[0063] In case first follower 3 or the second follower 4 are moved to or close to the blocking position, the engaging element 11 touches the guiding contour 27. This situation is shown in figure 5. It can be seen that this position is not stable since the engaging element 11 tends to rotate the follower 3, 4 in a counter clockwise direction. In this way, the follower 3, 4 can be moved away from

the blocking position. When the engaging element 11 reaches the deepest point of the cut out 9, the follower is in a non blocking position.

[0064] The other two cut outs 9 in Figure 5 do not comprise such a guiding contour 27 but serve merely as haptical feed-back that a non blocking position can be obtained by letting the engaging element 11 engage with one of those cut outs 9.

[0065] Alternatively to the description of Figure 5 above, the blocking positions can cover only a small range of angles, namely the range of angles corresponding only with a part of one guiding contour 27 of one single cut out 9 when touching the engaging element 11. Therefore, only one cut out 9 is provided a guiding contour 27 leading the follower out of a blocking position. In this case the follower is asymmetric. Three cut outs 9, one cut out 9 on one side of the cut out 9 with the guiding contour 27 and two cut outs 9 on the other side of the cut out 9 with the guiding contour 27 serves merely as haptical feed-back that a non blocking position can be obtained by letting the engaging element 11 engage with one of those cut outs 9.

[0066] Figure 6 is a schematic view of a follower 3, 4 according to an alternative embodiment. In this embodiment, two special cutouts 9 are provided, a first cutout 9a and a second cutout 9b. The first cutout 9a has a guiding contour 27 that reaches the point which the engaging element 11 touches in case the follower 3, 4 is rotated to the blocking position. The follower 3, 4 is in the blocking position when the engaging element 11 touches the peak between the two cut outs 9a, 9b. In case the engaging element 11 comes into contact with the guiding contour 27 of the first cutout 9a, the follower 3, 4 is rotated clockwise.

[0067] In the same way, the second cutout 9b comprises a guiding contour 27 which also extends to the point which the engaging element 11 touches in case the follower 3, 4 is rotated to the blocking position. In case the engaging element 11 comes into contact with the guiding contour 27 of the second cutout 9b, the follower 3, 4 is rotated counter clockwise.

[0068] It can further be seen that the position of the engaging element 11 with the follower 3, 4 in the blocking position is not stable. Therefore, the engaging element 11 tends to move the follower 3, 4 in a clockwise or counter clockwise direction away from the blocking position.

[0069] Hence, the follower 3, 4 is reliably kept away from the blocking position. Therefore, blocking of the first follower 3 and the second follower 4 is avoided.

[0070] The other two cut outs 9 in Figure 6 do not comprise such a guiding contour 27 but serve merely as haptical feed-back that a non blocking position can be obtained by letting the engaging element 11 engage with one of those cut outs 9.

[0071] Energy for rotating the follower 3, 4 is provided by the elastic element 12, which particularly is a spring. Said elastic element 12 presses the engaging element 11 to the circumferential surface 7 of the follower 3, 4

such that the engaging element 11, together with the guiding contour 27, can move the follower 3, 4.

[0072] The follower 3,4 is not connected to the spring 12 in order to let the follower 3, 4 rotate freely.

List of reference signs

[0073]

1	dead bolt locking mechanism	10
2	door lock	
3	first follower	
4	second follower	
5	operation rack	
6	dead bolt	15
7	circumferential surface	
8	bearing surface	
9	cutout	
9a	first cutout	
9b	second cutout	20
10	holding element	
11	engaging element	
12	elastic element	
13	connecting pattern	
14	key cylinder	25
15	thumb turn	
16	cam	
17	side surface	
18	housing	
19	spring lock bolt	30
20	notch	
21	first housing element	
22	second housing element	
23	door handle	
24	teeth	35
25	through hole	
26	indication element	
27	guiding contour	
100	displacement direction	
200	rotation axis	40

Claims

1. Dead bolt locking mechanism (1) comprising:
 - an operation rack (5) being movable along a predefined displacement direction (100) and being connectable to a dead bolt (6),
 - a first follower (3) and a second follower (4) which are rotatable about a rotation axis (200), and
 - an engaging element (11),
 - wherein the first follower (3) and the second follower (4) are adapted to be able to rotate independently and each of the first follower (3) and the second follower (4) can move the operation rack (5) along the displacement direction
2. Dead bolt locking mechanism (1) according to claim 1, **characterized in that** the engaging element (11), especially a ball, is pressed to the first follower (3) or the second follower (4) comprising the counterelement (9) by force of an elastic element (12) of the dead bolt locking mechanism (1) and being engageable in the counterelement (9), especially a cutout.
3. Dead bolt locking mechanism (1) according to claim 1 or 2, **characterized in that** the engaging element (11) is engaged with the counterelement (9) in order to avoid that the first follower (3) and/or the second follower (4) comprising the counterelement (9) are situated in a blocking position or blocking positions where the first follower (3) and/or the second follower (4) block the movement of the operation rack (5).
4. Dead bolt locking mechanism (1) according to any of the previous claims **characterized in that** the first follower (3) and/or the second follower (4) comprise at least one counterelement (9) which gives a feedback to the user that the respective follower (3,4) is situated in a non-blocking position.
5. Dead bolt locking mechanism (1) according to any of the previous claims **characterized in that** at least one further counterelement (9) is provided in the first follower (3) and/or the second follower (4) **in that** way that the blocking position is reached by turning clockwise while disengaging the counterelement (9) from the engaging element (11) and/or at least one further counterelement (9) is provided in the first follower (3) and/or the second follower (4) **in that** way that the blocking position is reached by turning counter clockwise while disengaging the counterelement (9) from the engaging element (11), wherein especially at least two counterelements (9) are provided in the first follower (3) and/or the second follower (4)

(100), and

• wherein the first follower (3) and/or the second follower (4), especially a circumferential surface (7) of the follower (3, 4), comprises at least one counterelement (9) with which the engaging element (11) is engageable to situate the respective first follower (3) and/or second follower (4) in a non-blocking position, wherein a non-blocking position is a position in which the follower (3, 4) with the counterelement (9) does not prohibit or block the movement of the operation rack (5),

characterized in that that the engaging element (11) cooperates with the counterelement (9) so that the first follower (3) and/or the second follower (4) comprising the counterelement (9) are rotated from a blocking position to a non-blocking position due to engagement of the engaging element (11) and the counterelement (9).

in that way that the blocking position is reached by turning clockwise and/or counter clockwise while disengaging the counterelement (9) from the engaging element (11).

6. Dead bolt locking mechanism (1) according to any of the previous claims, **characterized in that** the first follower (3) and/or the second follower (4) comprising the counterelement (9) comprises a guiding contour (27) to guide the first follower (3) and/or the second follower (4) to a non-blocking position, especially that the counterelement (9) comprises the guiding contour (27). 5
7. Dead bolt locking mechanism (1) according to any of the previous claims, **characterized in that** the first follower (3) and/or the second follower (4) comprising the counterelement (9) is moved from a blocking position to a non-blocking position by the force of the elastic element (12), especially a spring (12). 10
8. Dead bolt locking mechanism (1) according to claim 7, **characterized in that** the elastic element (12) is free of being fixed to the first follower (3) and/or the second follower (4) comprising the counterelement, especially that the engaging element (11) is movable by the elastic element (12). 15
9. Dead bolt locking mechanism (1) according to any of the previous claims, **characterized in that** the first follower (3) and/or the second follower (4) comprising the counterelement (9) are movable to a non-blocking position by a guiding contour (27), whereas the non-blocking position can be reached both by being rotated in a clockwise and a counter clockwise sense. 20
10. Dead bolt locking mechanism (1) according to any of the previous claims **characterized in that** the first follower (3) and/or the second follower (4) comprise a first counterelement (9a) and a second counterelement (9b), wherein one of the counterelements (9a, 9b) is configured to drive the first follower (3) and/or the second follower (4) out of the blocking position in a clockwise sense and the other counterelement (9a, 9b) is configured to drive the first follower (3) and/or the second follower (4) out of the blocking position in a counter clockwise sense. 25
11. Dead bolt locking mechanism (1) according to any of the previous claims **characterized in that** the first follower (3) and/or the second follower (4) comprises at least one counterelement (9) which is built without a guiding contour (27). 30
12. Door lock (2) comprising a bolt locking mechanism (1) according to any of the previous claims. 35

13. Door lock (2) according to claim 12, **characterized in that** the first follower (3) is coupled to key cylinder (14) and the second follower (4) is coupled to a thumb turn (15).

14. Door lock (2) according to claim 12 or 13 **characterized in that** the door lock is actuated by the manual forces of a user.

Patentansprüche

1. Riegelschließmechanismus (1), umfassend:

- eine Betriebsstange (5), die entlang einer vordefinierten Verschieberichtung (100) bewegbar ist und mit einem Riegel (6) verbindbar ist,
- eine erste Nuss (3) und eine zweite Nuss (4), die um eine Drehachse (200) drehbar sind, und
- ein Eingriffselement (11),
- wobei die erste Nuss (3) und die zweite Nuss (4) dazu ausgelegt sind, sich unabhängig drehen zu können, und jede der ersten Nuss (3) und der zweiten Nuss (4) kann die Betriebsstange (5) entlang der Verschieberichtung (100) bewegen, und
- wobei die erste Nuss (3) und/oder die zweite Nuss (4), insbesondere eine Umfangsfläche (7) der Nuss (3, 4), mindestens ein Gegenelement (9) umfassen/umfasst, mit welchem das Eingriffselement eingreifen kann, um die jeweilige erste Nuss (3) und/oder zweite Nuss (4) in eine Nicht-Blockierposition zu bringen, wobei eine Nicht-Blockierposition eine Position ist, in welcher die Nuss (3, 4) mit dem Gegenelement (9) die Bewegung der Betriebsstange (5) nicht verhindert oder blockiert,

dadurch gekennzeichnet, dass das Eingriffselement (11) mit dem Gegenelement (9) dergestalt kooperiert, dass die erste Nuss (3) und/oder die zweite Nuss (4) umfassend das Gegenelement (9) aufgrund des Eingreifens des Eingriffselementes (11) und des Gegenelementes (9) von einer Blockierposition in eine Nicht-Blockierposition gedreht werden/wird.

2. Riegelschließmechanismus (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** das Eingriffselement (11), speziell eine Kugel, an die erste Nuss (3) oder die zweite Nuss (4) umfassend das Gegenelement (9) durch die Kraft eines elastischen Elements (12) des Riegelschließmechanismus (1) gedrückt wird und in das Gegenelement (9), speziell einen Ausschnitt eingreifen kann.
3. Riegelschließmechanismus (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Ein-

- griffselement (11) mit dem Gegenelement (9) eingreift, um zu vermeiden, dass die erste Nuss (3) und/oder die zweite Nuss (4) umfassend das Gegenelement (9) sich in einer Blockierposition oder Blockierpositionen befinden/befindet, wobei die erste Nuss (3) und/oder die zweite Nuss (4) die Bewegung der Betriebsstange (5) blockieren/blockiert.
4. Riegelschließmechanismus (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die erste Nuss (3) und/oder die zweite Nuss (4) mindestens ein Gegenelement (9) umfassen/umfasst, das dem Benutzer eine Rückmeldung gibt, dass sich die entsprechende Nuss (3, 4) in einer Nicht-Blockierposition befindet.
5. Riegelschließmechanismus (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** mindestens ein weiteres Gegenelement (9) in der ersten Nuss (3) und/oder der zweiten Nuss (4) dergestalt bereitgestellt ist, dass die Blockierposition durch Drehen im Uhrzeigersinn erreicht wird, während das Gegenelement (9) von dem Eingriffselement (11) gelöst wird und/oder mindestens ein weiteres Gegenelement (9) in der ersten Nuss (3) und/oder der zweiten Nuss (4) dergestalt bereitgestellt ist, dass die Blockierposition durch Drehen im Uhrzeigersinn erreicht wird, während das Gegenelement (9) von dem Eingriffselement (11) gelöst wird, wobei insbesondere mindestens zwei Gegenelemente (9) in der ersten Nuss (3) und/oder der zweiten Nuss (4) dergestalt bereitgestellt sind, dass die Blockierposition durch Drehen im Uhrzeigersinn und/oder gegen den Uhrzeigersinn erreicht wird, während das Gegenelement (9) von dem Eingriffselement (11) gelöst wird.
6. Riegelschließmechanismus (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die erste Nuss (3) und/oder die zweite Nuss (4) umfassend das Gegenelement (9) eine Führungskontur (27) umfassen/umfasst, um die erste Nuss (3) und/oder die zweite Nuss (4) in eine Nicht-Blockierposition zu führen, insbesondere dass das Gegenelement (9) die Führungskontur (27) umfasst.
7. Riegelschließmechanismus (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die erste Nuss (3) und/oder die zweite Nuss (4) umfassend das Gegenelement (9) von einer Blockierposition in eine Nicht-Blockierposition durch die Kraft des elastischen Elements (12), speziell eine Feder (12) bewegt werden/wird.
8. Riegelschließmechanismus (1) nach Anspruch 7, **dadurch gekennzeichnet, dass** das elastische Element (12) frei davon ist, an der ersten Nuss (3) und/oder der zweiten Nuss (4) umfassend das Gegenelement (9) festgelegt zu sein, insbesondere dass das Eingriffselement (11) durch das elastische Element (12) bewegbar ist.
9. Riegelschließmechanismus (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die erste Nuss (3) und/oder die zweite Nuss (4) umfassend das Gegenelement (9) durch eine Führungskontur (27) in eine Nicht-Blockierposition bewegbar sind/ist, wohingegen die Nicht-Blockierposition durch Drehen sowohl im Uhrzeigersinn als auch im Gegenuhrzeigersinn erreicht werden kann.
10. Riegelschließmechanismus (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die erste Nuss (3) und/oder die zweite Nuss (4) ein erstes Gegenelement (9a) und ein zweites Gegenelement (9b) umfassen, wobei eines der Gegenelemente (9a, 9b) dazu ausgestaltet ist, die erste Nuss (3) und/oder die zweite Nuss (4) aus der Blockierposition im Uhrzeigersinn anzutreiben und das andere Gegenelement (9a, 9b) dazu ausgestaltet ist, die erste Nuss (3) und/oder die zweite Nuss (4) aus der Blockierposition im Gegenuhrzeigersinn anzutreiben.
11. Riegelschließmechanismus (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die erste Nuss (3) und/oder die zweite Nuss (4) mindestens ein Gegenelement (9) umfassen/umfasst, das ohne eine Führungskontur (27) ausgebildet ist.
12. Türschloss (2), umfassend einen Riegelschließmechanismus (1) nach einem der vorhergehenden Ansprüche.
13. Türschloss (2) nach Anspruch 12, **dadurch gekennzeichnet, dass** die erste Nuss (3) mit einem Schlüsselzylinder (11) gekoppelt ist und die zweite Nuss (4) mit einem Daumenknopf (15) gekoppelt ist.
14. Türschloss (2) nach Anspruch 12 oder 13, **dadurch gekennzeichnet, dass** das Türschloss durch manuelle Kräfte eines Benutzers betätigt wird.

Revendications

1. Mécanisme de verrouillage à pêne dormant (1), comportant:
- une barre d'opération (5) mobile le long d'une direction de déplacement (100) prédéfinie et pouvant être connectée à un pêne dormant (6),
 - un premier fouillot (3) et un deuxième fouillot

- (4), lesquels sont rotatifs autour d'un axe de rotation (200), et
- un élément d'engagement (11),
 - dans lequel le premier fouillot (3) et le deuxième fouillot (4) sont adaptés à être capable de tourner indépendamment et chacun du premier fouillot (3) et du deuxième fouillot (4) peut faire bouger la barre d'opération (5) le long de la direction de déplacement (100), et
 - dans lequel le premier fouillot (3) et/ou le deuxième fouillot (4), tout particulièrement une surface circonférentielle (7) du fouillot (3, 4), comportent/comporte au moins un contre-élément (9) avec lequel l'élément d'engagement (11) peut engager pour placer le premier fouillot (3) et/ou le deuxième fouillot (4) respectifs dans une position non-blocage, dans lequel la position non-blocage est la position, dans laquelle le fouillot (3, 4) avec le contre-élément (9) n'empêche pas ou ne bloque pas le mouvement de la barre d'opération (5),
- caractérisé en ce que** l'élément d'engagement (11) coopère avec le contre-élément (9) de sorte que le premier fouillot (3) et/ou le deuxième fouillot (4) comportant le contre-élément (9) sont tournés d'une position de blocage vers une position de non-blocage en raison de l'engagement de l'élément d'engagement (11) et du contre-élément (9).
2. Mécanisme de verrouillage à pêne dormant (1) selon la revendication 1, **caractérisé en ce que** l'élément d'engagement (11), tout particulièrement une bille, est pressé contre le premier fouillot (3) ou le deuxième fouillot (4) comportant le contre-élément (9) par la force d'un élément élastique (12) du mécanisme de verrouillage à pêne dormant (1) et étant engageable dans le contre-élément (9), tout particulièrement un évidement.
 3. Mécanisme de verrouillage à pêne dormant (1) selon la revendication 1 ou 2, **caractérisé en ce que** l'élément d'engagement (11) est engagé avec le contre-élément (9) pour éviter que le premier fouillot (3) et/ou le deuxième fouillot (4) comportant le contre-élément (9) se trouvent/trouve dans une position de blocage ou des positions de blocage, où le premier fouillot (3) et/ou le deuxième fouillot (4) bloquent/bloque le mouvement de la barre d'opération (5).
 4. Mécanisme de verrouillage à pêne dormant (1) selon l'une des revendications précédentes, **caractérisé en ce que** le premier fouillot (3) et/ou le deuxième fouillot (4) comportent/comporte au moins un contre-élément (9), lequel donne du feedback à l'utilisateur que le fouillot (3, 4) respectif se trouve dans une position de non-blocage.
 5. Mécanisme de verrouillage à pêne dormant (1) selon l'une des revendications précédentes, **caractérisé en ce qu'**au moins un autre contre-élément (9) est prévu dans le premier fouillot (3) et/ou le deuxième fouillot (4) de telle façon que la position de blocage est obtenue en tournant dans le sens des aiguilles d'une montre tout en désengageant le contre-élément (9) de l'élément d'engagement (11) et/ou au moins un autre contre-élément (9) est prévu dans le premier fouillot (3) et/ou le deuxième fouillot (4) de telle façon que la position de blocage est obtenue en tournant dans le sens des aiguilles d'une montre tout en désengageant le contre-élément (9) de l'élément d'engagement (11), dans lequel tout particulièrement au moins deux contre-éléments (9) sont prévus dans le premier fouillot (3) et/ou le deuxième fouillot (4) de telle façon que la position de blocage est obtenue en tournant dans sens des aiguilles d'une montre et/ou contre le sens des aiguilles d'une montre, tout en désengageant le contre-élément (9) de l'élément d'engagement (11).
 6. Mécanisme de verrouillage à pêne dormant (1) selon l'une des revendications précédentes, **caractérisé en ce que** le premier fouillot (3) et/ou le deuxième fouillot (4) comportant le contre-élément (9) comportent/comporte un contour de guidage (27) pour guider le premier fouillot (3) et/ou le deuxième fouillot (4) vers une position de non-blocage, tout particulièrement **en ce que** le contre-élément (9) comporte le contour de guidage (27).
 7. Mécanisme de verrouillage à pêne dormant (1) selon l'une des revendications précédentes, **caractérisé en ce que** le premier fouillot (3) et/ou le deuxième fouillot (4) comportant le contre-élément (9) sont bougés/est bougé d'une position de blocage vers une position de non-blocage par la force de l'élément élastique (12), tout particulièrement un ressort (12).
 8. Mécanisme de verrouillage à pêne dormant (1) selon la revendication 7, **caractérisé en ce que** l'élément élastique (12) est libre d'être fixé au premier fouillot (3) et/ou au deuxième fouillot (4) comportant le contre-élément, tout particulièrement que l'élément d'engagement (11) est mobile par l'élément élastique (12).
 9. Mécanisme de verrouillage à pêne dormant (1) selon l'une des revendications précédentes, **caractérisé en ce que** le premier fouillot (3) et/ou le deuxième fouillot (4) comportant le contre-élément (9) sont mobiles/est mobile vers une position de non-blocage par un contour de guidage (27), tandis que la position de non-blocage peut être obtenue tant par rotation dans le sens des aiguilles d'une montre que contre le sens des aiguilles d'une montre.

10. Mécanisme de verrouillage à pêne dormant (1) selon l'une des revendications précédentes, **caractérisé en ce que** le premier fouillot (3) et/ou le deuxième fouillot (4) comportant un premier contre-élément (9a) et un deuxième contre-élément (9b), dans lequel un des contre-éléments (9a, 9b) est aménagé à entraîner le premier fouillot (3) et/ou le deuxième fouillot (4) dans le sens des aiguilles d'une montre pour sortir de la position de blocage et l'autre contre-élément (9a, 9b) est aménagé à entraîner le premier fouillot (3) et/ou le deuxième fouillot (4) contre le sens des aiguilles d'une montre pour sortir de la position de blocage.
11. Mécanisme de verrouillage à pêne dormant (1) selon l'une des revendications précédentes, **caractérisé en ce que** le premier fouillot (3) et/ou le deuxième fouillot (4) comportent/comporte au moins un contre-élément (9), lequel est aménagé sans un contour de guidage (27).
12. Serrure de porte (2), comportant un mécanisme de verrouillage à pêne dormant (1) selon l'une des revendications précédentes.
13. Serrure de porte (2) selon la revendication 12, **caractérisée en ce que** le premier fouillot (3) est accouplé à un cylindre à clé (14) et le deuxième fouillot (4) est accouplé à un pousier (15).
14. Serrure de porte (2) selon la revendication 12 ou 13, **caractérisée en ce que** la serrure de porte est actionnée par des forces manuelles d'un utilisateur.

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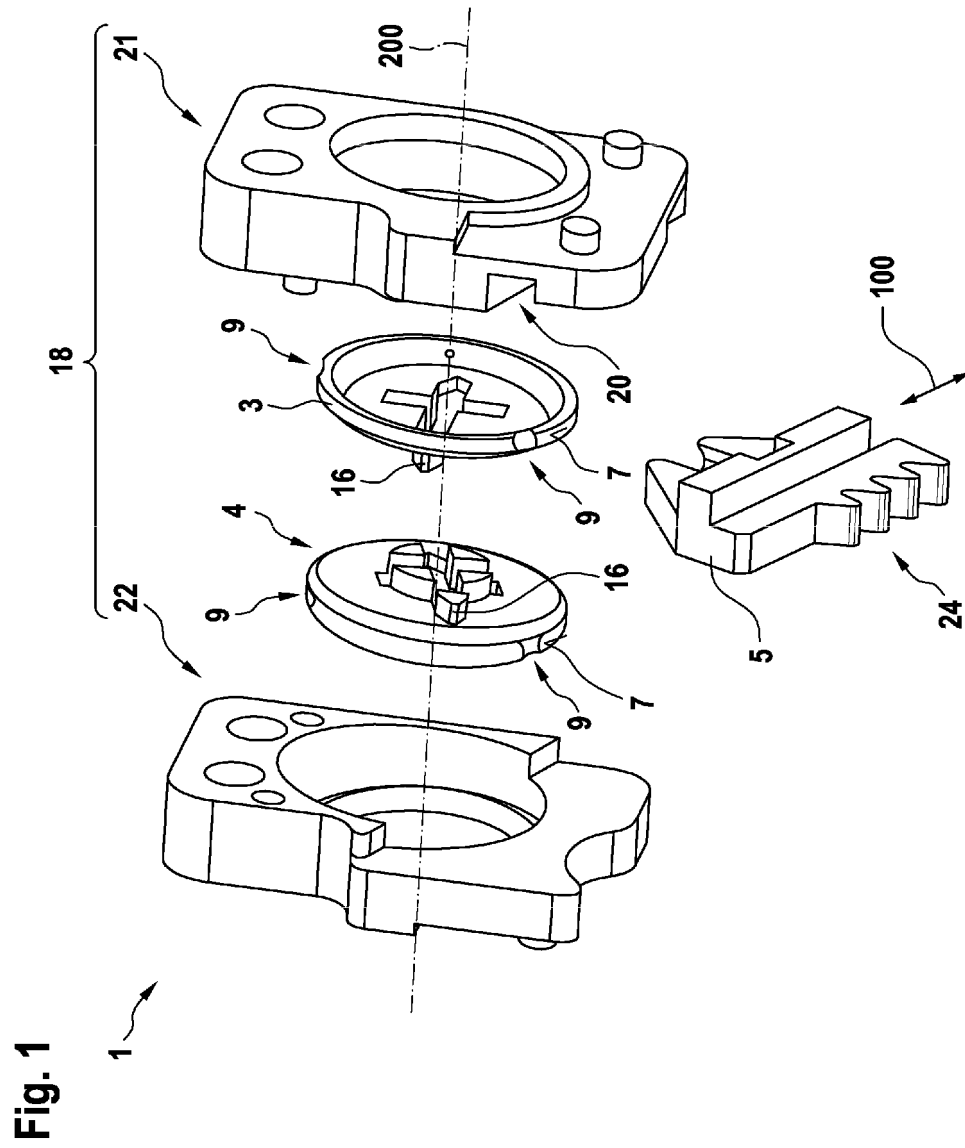


Fig. 2

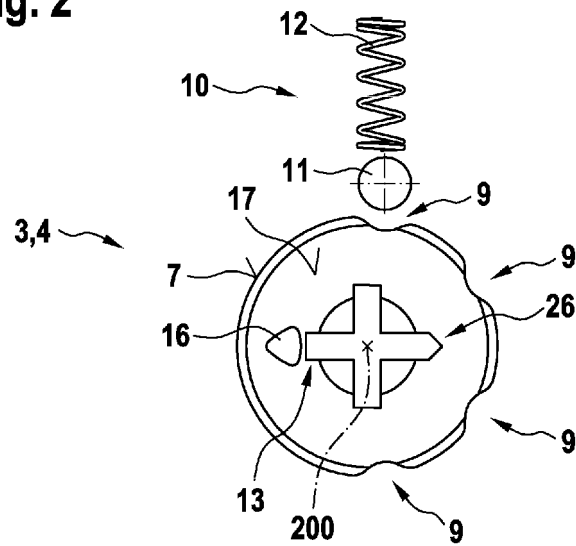
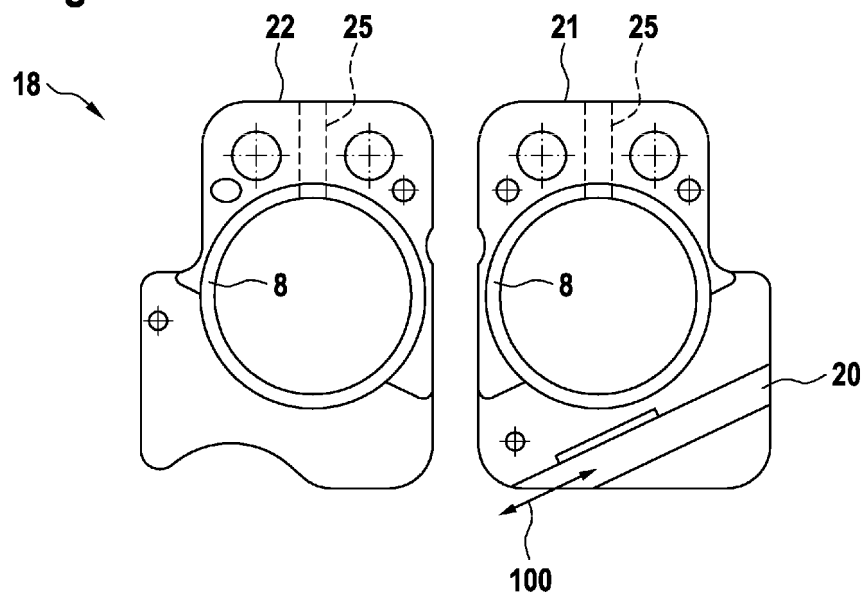


Fig. 3



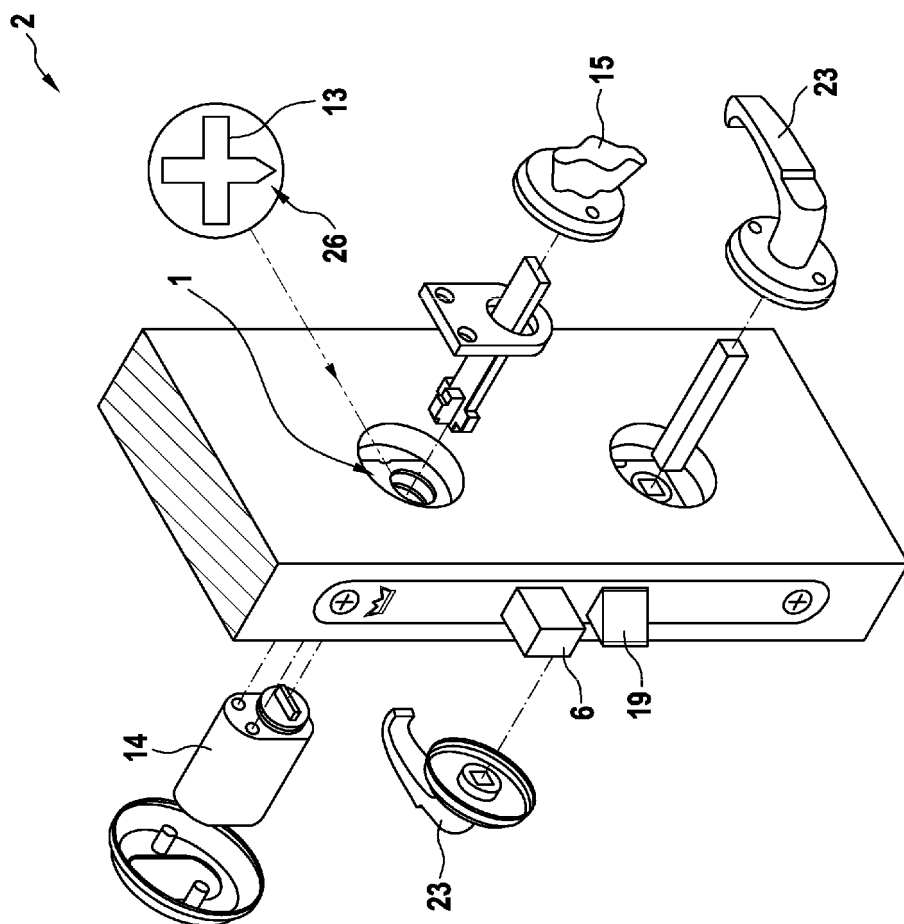


Fig. 4

Fig. 5

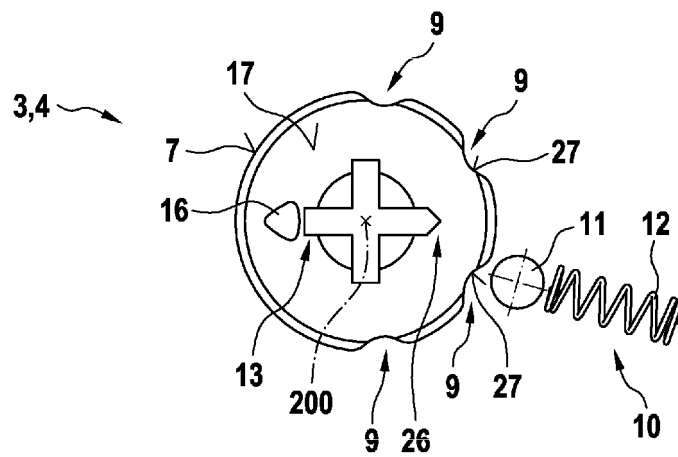
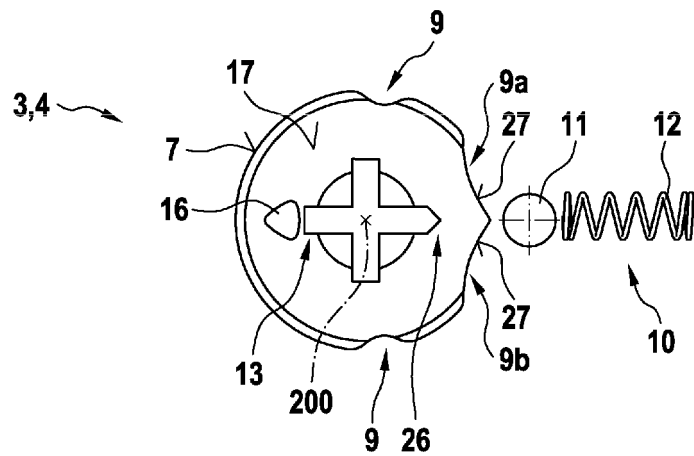


Fig. 6



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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