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(54) **HIGHLY BURGLAR-RESISTANT MORTISE LOCK FOR DOOR OR WINDOW**

(57) The mortise lock (1) for door and window comprises a vertically translating driving plate (3) and a driven plate (4), a first hook latch (5) and a second hook latch (6) pivoting, a first tip latch (10) and respectively a second tip latch (11) supported by the driving plate (3) and respectively the driven plate (4), a movement command for moving the driving plate (3), a first transmission con-

figured to transform the movement of the driving plate (3) into a movement in the opposite direction of the driven plate (4), a second transmission configured to transform the movement of the driving plate (3) into a movement of the first hook latch (5), and a third transmission configured to transform the movement of the driven plate (4) into a movement of the second hook latch (6).

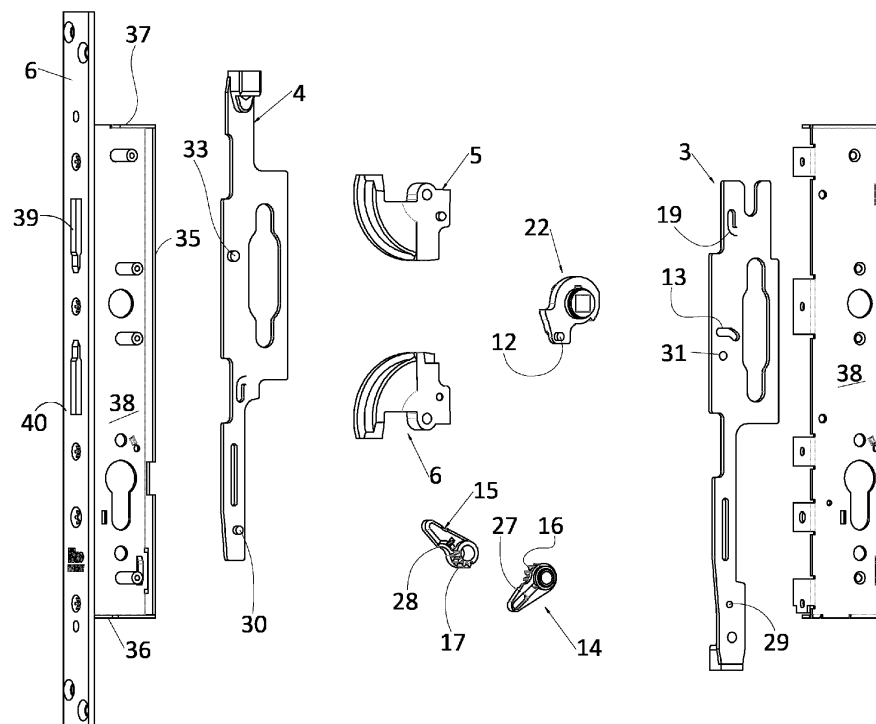


Fig 1

Description

[0001] The present invention relates to a mortise lock for door or window with high burglary resistance. The mortise lock that is the subject of the invention comprises four locking points defined by two swinging hook latches and two translating tip latches.

[0002] There are numerous variants of locks of the above-mentioned type, which can be used in a variety of sectors, e.g. in the area of exterior fittings such as gates and shutters.

[0003] Locks of the above-mentioned type have various types of kinematics that allow for coordinated extraction and retraction of the latches.

[0004] Security against break-ins can sometimes be inadequate due to the fact that forcing one of the latches can often cause the remaining latches to retract as well.

[0005] In order to improve security against break-ins, special anti-burglary systems can be integrated into the locks. However, these generally consist of dedicated parts that contribute to increasing the complexity of the locks, which has a negative impact on production costs, whether due to the increased number of components, longer assembly times, or complicated warehouse logistics.

[0006] Generally speaking, these burglary-resistant systems are differentiated by burglary on swinging hook latches and translating tip latches.

[0007] The technical task that the present invention proposes is, therefore, to realise a mortise lock of the type described above that eliminates the complained of technical drawbacks of the known technique.

[0008] In the context of this technical task, one aim of the invention is to realise a mortise lock of the type described above that improves burglary resistance without complications in construction.

[0009] Another purpose of the invention is to realise a mortise lock of the type described above that improves break-in resistance without increasing production costs.

[0010] The technical task, as well as these and other purposes, according to the present invention are achieved by realising a mortise lock for a window or door, comprising a case, a driving plate translating vertically in the case, a driven plate translating vertically in the case, a first hook latch and a second hook latch tilting in opposite direction around respective parallel horizontal rotation pins between a position of retraction in the case and a position of extraction from a front plate of the case, a first tip latch fixed to said driving plate and a second tip latch fixed to said driven plate translating vertically in the opposite direction between a position of retraction in the case and a position of extraction from the case, a movement command of the driving plate comprising a first movement transmission pin slidably engaged in a first shaped slot, a first transmission configured to transform the movement of the driving plate into a movement in the opposite direction of the driven plate, a second transmission configured to transform the movement of the driving

plate into a movement of the first hook latch, and a third transmission configured to transform the movement of the driven plate into a movement of the second hook latch, wherein the first transmission comprises a rotating cam for transferring the movement and a rotating cam or receiving the movement which are provided with meshing teeth the second transmission comprises a second movement transmission pin slidably engaged in a second shaped slot, the third transmission comprises a third movement transmission pin slidably engaged in a third shaped slot, wherein the first shaped slot and the second shaped slot are obtained on the driving plate, the third shaped slot is obtained on the driven plate, the first movement transmission pin is rigidly supported by a rotor operable by a handle panel and/or by a lock cylinder, the second movement transmission pin is rigidly supported by the first hook latch, the third movement transmission pin is rigidly supported by the second hook latch.

[0011] In a preferred embodiment of the invention said first tilting hook latch is positioned above said second tilting hook latch and said first translating tip latch is positioned below said second translating tip latch.

[0012] In a preferred embodiment of the invention said rotating cam for transferring the movement and said rotating cam for receiving the movement are pivoted to the case by means of respective horizontal rotation pins parallel to said horizontal rotation pins of said first and second hook latches.

[0013] In a preferred embodiment of the invention said rotating cam for transferring the movement and said rotating cam for receiving the movement have respective linear slots in which respective movement transmission pins rigidly fixed to said driving plate and respectively to said driven plate are slidably engaged.

[0014] In a preferred embodiment of the invention said second shaped slot has a vertical section in which the second movement transmission pin is engaged when the first hook latch is in the position of extraction from the case.

[0015] Similarly, in a preferred embodiment of the invention said third shaped slot has a vertical section in which the second movement transmission pin is engaged when the second hook latch is in the position of extraction from the case.

[0016] In a preferred embodiment of the invention said driving plate has a locking pin engageable with a vertical wall of a recess of said second hook latch for locking the latter in the extraction position. Similarly, in a preferred embodiment of the invention said driven plate has a locking pin engageable with a vertical wall of a recess of said first hook latch for locking the latter in the extraction position.

[0017] Advantageously said first transmission is structured to break first in case an extracted tip latch is forced to retract so as to prevent the retraction in cascade of all extracted latches.

[0018] Advantageously, the locking pins and second movement transmission pins are also unable to transmit

vertical forces when forcing a latch with an extracted hook, thus preventing retraction in cascade of all latches.

[0019] Further features and advantages of the invention will become more apparent from the description of a preferred but non-exclusive form of execution of the mortise lock according to the invention, illustrated by way of illustration and not limitation in the accompanying drawings, in which

Figure 1 shows an exploded view of the main components of the lock;

Figures 2 A' to 2 E' show the co-ordinated sequence of latch extraction to close the lock, where for clarity the driving plate is highlighted in bold;

Figures 2 A'' to 2 E'' show the same co-ordinated sequence of latch extraction to close the lock, where for clarity the driven plate is highlighted in bold.

[0020] With reference to the above-mentioned figures, a mortise lock for door or window is shown, indicated overall by reference number 1.

[0021] Lock 1 comprises a case 2 housing four latches 5, 6, 10, 11, particularly a first swinging hook latch 5 and a second swinging hook latch 6, a first translating tip latch 10 and a second translating tip latch 11.

[0022] Case 2 comprises a front plate 9, a back wall 35, a lower wall 36, an upper wall 37 and two vertical sides 38, one right and one left.

[0023] The front plate 9 has a first slot 39 of reversible transit of the first swinging hook latch 5 from a retracted position in the case 2 for opening the door or window to a position extracted from the case 3 for closing the door or window, and a second slot 40 of reversible transit of the second swinging hook latch 6 from a retracted position in the case 2 for opening the door or window to a position extracted from the case 2 for closing the door or window.

[0024] The first hook latch 5 is rotatable around its horizontal rotation pin 7 and the second hook latch 6 is rotatable in the opposite direction to the horizontal rotation pin 7 around its horizontal rotation pin 8 parallel to the horizontal rotation pin 7 of the first hook latch 5.

[0025] The rotation pins 7, 8 are fixed between the two vertical sides 38 of case 2.

[0026] The first tip latch 10 is fixed to a driving plate 3 and the second tip latch 11 is fixed to a driven plate 4.

[0027] Driving plate 3 and driven plate 4 are housed in the case 2 and are guided to move vertically in opposite direction.

[0028] The first tip latch 10 and the second tip latch 11 can be moved in the opposite direction to move reversibly from a retracted position in case 2 to open the door or window to a position extracted from case 2 to close the door or window.

[0029] The lock 1 comprises a movement command of the driving plate 3 comprising a first pin 12 for transmitting the movement slidably engaged into a first shaped slot 13 formed in the driving plate 3.

[0030] The movement command of the driving plate 3 includes a rotor 22 which rigidly supports the first transmitting movement pin 12.

[0031] In a known manner, and therefore not described or illustrated in detail, by means of a handle panel 23 and/or a cylinder 24 with a key, the rotor 22 can be operated in rotation about a geometric axis parallel to the rotation pins 7, 8.

[0032] Lock 1 further comprises a first transmission configured to transform the movement of the driving plate 3 into a movement in the opposite direction of the driven plate 4, a second transmission configured to transform the movement of the driving plate 3 into a movement of the first hook latch 5, and a third transmission configured to transform the movement of the driven plate 4 into a movement of the second hook latch 6.

[0033] The first transmission comprises a rotating cam 14 for transferring the movement and a rotating cam 15 for receiving the movement equipped with meshing teeth 16, 17.

[0034] The second transmission comprises a second movement transmission pin 18 slidably engaged in a second shaped slot 19 in the driving plate 3.

[0035] The second movement transmission pin 18 is rigidly supported by the first hook latch 5.

[0036] The third transmission includes a third movement transmission pin 20 slidably engaged into a third shaped slot 21 formed in the driven plate 4.

[0037] The third movement transmission pin 20 is rigidly supported by the second hook latch 6.

[0038] In the solution illustrated, the first swinging hook latch 5 is positioned above the second swinging hook latch 6 and the first translating tip latch 10 is positioned below the second translating tip latch 11.

[0039] In practice, the first translating tip latch 10 is removable through an opening in the lower wall 36 of case 2 while the second translating tip latch 11 is removable through an opening in the upper wall 37 of case 2.

[0040] The rotating cam 14 for transferring the movement is infulcrated to the case 2 via a horizontal rotation pin 25 and similarly the rotating cam 15 for receiving the movement is infulcrated to the case 2 via a horizontal rotation pin 26.

[0041] The horizontal rotation pins 25, 26 are parallel to the horizontal rotation pins 7, 8 of the first and second hook latch 5, 6.

[0042] The rotating cam 14 for transferring the movement has a linear slot 27 in which a movement transmission pin 29 rigidly fixed to the driving plate 3 is slidably engaged, while the rotating cam 15 for receiving the movement has a linear slot 28 in which a movement transmission pin 30 rigidly fixed to the driven plate 4 is slidably engaged.

[0043] The second shaped slot 19 has a horizontal section 19a in which the second movement transmission pin 18 is engaged when the first hook latch 5 is in the retracted position in case 2 and a vertical section 19b in which the second movement transmission pin 18 is engaged

when the first hook latch 5 is in the fully extracted position from case 2.

[0044] Similarly, the third shaped slot 21 has a horizontal section 21a in which the third movement transmission pin 20 is engaged when the second hook latch 6 is in the retracted position in case 2 and a vertical section 21b in which the second movement transmission pin 18 is engaged when the second hook latch 6 is in the fully extracted position from case 2.

[0045] The driving plate 3 has a locking pin 31 which can be engaged in a recess 32 of the second hook latch 6 to lock the latter in the extracted position.

[0046] Similarly, the driven plate 4 has a locking pin 33 which can be engaged in a recess 34 of the first hook latch 5 to lock the latter in the extracted position.

[0047] Advantageously, the first transmission is structured to break as first in the event of forcing a latch 10, 11.

[0048] Advantageously, the locking pins 31, 33 and the second movement transmission pins 18, 20 are also unable to transfer vertical forces so as to prevent the retraction in cascade of all latches 5, 6, 10, 11.

[0049] The normal operation of lock 1, when closing the door or window, is as follows.

[0050] Lock 1 is initially in the configuration shown in figure 2A', 2A'.

[0051] The user, by means of the key inserted in the cylinder or the handle inserted in the handle panel 23, drives the rotor 22 into rotation.

[0052] The first movement transmission pin 12 moves jointly with the rotor 22 and, by means of the sliding engagement along the shaped slot 13, pulls the driving plate 3 vertically downwards in the direction of extraction of the first tip latch 10.

[0053] In its downward movement, the driving plate 3, through the sliding engagement of the second shaped slot 19 along the second movement transmission pin 18, pulls the first hook latch 5 into rotation in the direction of extraction.

[0054] In the downward movement of the driving plate 3, the second movement transmission pin 18 moves from the horizontal section 19a to the vertical section 19b of the second shaped slot 19 and the locking pin 31 supported by the driving plate 3 engages a vertical wall 32a of the recess 32 of the second hook latch 6.

[0055] Also in the downward movement of the driving plate 3, by engaging the teeth 16 of the rotating cam 14 for transferring the movement with the teeth 17 of the rotating cam 15 for receiving the movement, the downward movement of the driving plate 3 is transformed into an upward movement of the driven plate 4 in the direction of the extraction of the second tip latch 11.

[0056] In its upward movement, the driven plate 4, through the sliding engagement of the third shaped slot 21 along the third transmission movement pin 20, pulls the second hook latch 6 into rotation in the direction of extraction.

[0057] In the upward movement of the driven plate 4, the third transmission movement pin 20 moves from the

horizontal section 21a to the vertical section 21b of the third shaped slot 21 and the locking pin 33 supported by the driven plate 4 engages a vertical wall 34a of the recess 34 of the first hook latch 5.

[0058] When the lock is closed, there are basically two different cases of break-in, a first case involving the forcing of one of the hook latches 5, 6 and a second case involving the forcing of one of the tip latches 10, 11.

[0059] In the event that the attacker succeeds in forcing the first hook-latch 5 to retract, the other latches 6, 10, 11 do not retract since neither the second movement transmission pin 18 engaging the vertical section of the shaped slot 19 is capable of transferring vertical forces to the driving plate 3 nor the blocking pin 33 engaging the vertical wall 34a of the recess 34 is capable of transferring vertical forces to the driven plate 4.

[0060] In the event that the attacker succeeds in forcing the first hook-latch 6 to retract, the other latches 5, 10, 11 do not retract since neither the third movement transmission pin 20 engaging the vertical section of the shaped slot 21 is capable of transferring vertical forces to the driven plate 4 nor the blocking pin 31 engaging the vertical wall 32a of the recess 32 is capable of transferring vertical forces to the driving plate 3.

[0061] In the event that the attacker succeeds in forcing the first retracting latch 10 to retract, as mentioned, the first transmission mechanically collapses so that the other latches 5, 6, 11 do not retract.

[0062] In the event that the attacker succeeds in forcing the retraction translation of the second tip latch 11, only the rotation in the retraction direction of the second hook latch 6 dragged by the movement of the driven plate 4 can be triggered, but as mentioned other latches 5, 10 do not retract because the first transmission collapses as first.

[0063] The mortise lock thus conceived is susceptible to numerous modifications and variations, all within the scope of the inventive concept; moreover, all details can be replaced by technically equivalent elements.

[0064] In practice, the materials used, as well as the dimensions, can be any according to requirements and the state of the art.

Claims

1. A mortice lock (1) for a window or door, comprising a case (2), a driving plate (3) translating vertically in the case (2), a driven plate (4) translating vertically in the case (2), a first hook latch (5) and a second hook latch (6) tilting in opposite direction around respective parallel horizontal rotation pins (7, 8) between a position of retraction in the case (2) and a position of extraction from a front plate (9) of the case (2), a first tip latch (10) fixed to said driving plate (3) and a second tip latch (11) fixed to said driven plate (4) translating vertically in the opposite direction between a position of retraction in the case (2) and a

position of extraction from the case (2), a movement command of the driving plate (3) comprising a first movement transmission pin (12) slidably engaged in a first shaped slot (13), a first transmission configured to transform the movement of the driving plate (3) into a movement in the opposite direction of the driven plate (4), a second transmission configured to transform the movement of the driving plate (3) into a movement of the first hook latch (5), and a third transmission configured to transform the movement of the driven plate (4) into a movement of the second hook latch (6), wherein the first transmission comprises a rotating cam (14) for transferring the movement and a rotating cam (15) for receiving the movement which are provided with meshing teeth (16, 17), the second transmission comprises a second movement transmission pin (18) slidably engaged in a second shaped slot (19), the third transmission comprises a third movement transmission pin (20) slidably engaged in a third shaped slot (21), wherein the first shaped slot (13) and the second shaped slot (19) are obtained on the driving plate (3), the third shaped slot (21) is obtained on the driven plate (4), the first movement transmission pin (12) is rigidly supported by a rotor (22) operable by a handle panel (23) and/or by a lock cylinder (24), the second movement transmission pin (18) is rigidly supported by the first hook latch (5), the third movement transmission pin (20) is rigidly supported by the second hook latch (6).

2. The mortice lock for a window or door according to the preceding claim, **characterized in that** said first tilting hook latch (5) is positioned above said second tilting hook latch (6) and said first translating tip latch (10) is positioned below said second translating tip latch (11).
3. The mortice lock for a window or door according to any preceding claim, **characterized in that** said rotating cam (14) for transferring the movement and said rotating cam (15) for receiving the movement are pivoted to the case (2) by means of respective horizontal rotation pins (25, 26) parallel to said horizontal rotation pins (7, 8) of said first and second hook latches (5, 6).
4. The mortice lock for a window or door according to the preceding claim, **characterized in that** said rotating cam (14) for transferring the movement and said rotating cam (15) for receiving the movement have respective linear slots (27, 28) in which respective movement transmission pins (29, 30) rigidly fixed to said driving plate (3) and respectively to said driven plate (4) are slidably engaged.
5. The mortice lock for a window or door according to any preceding claim, **characterized in that** said sec-

ond shaped slot (19) has a vertical section (19b) in which the second movement transmission pin (18) is engaged when the first hook latch (5) is in the position of extraction from the case (2).

6. The mortice lock for a window or door according to any preceding claim, **characterized in that** said third shaped slot (21) has a vertical section (21b) in which the second movement transmission pin (18) is engaged when the second hook latch (6) is in the position of extraction from the case (2).
7. The mortice lock for a window or door according to any preceding claim, **characterized in that** said driving plate (3) has a locking pin (31) engageable with a vertical wall (32a) of a recess (32) of said second hook latch (6) for locking the latter in the extraction position.
8. The mortice lock for a window or door according to any preceding claim, **characterized in that** said driven plate (4) has a locking pin (33) engageable with a vertical wall (34a) of a recess (34) of said first hook latch (5) for locking the latter in the extraction position.
9. The mortice lock for a window or door according to any preceding claim, **characterized in that** said first transmission is structured to break first in case an extracted tip latch (10, 11) is forced.
10. The mortice lock for a window or door according to claims 5 to 8, **characterized in that** it has a configuration such as to prevent the coordinated retraction of all the latches in case of break-in that entails a forced retraction rotation of the first hook latch (5) or of the second hook latch (6), said configuration including said second movement transmission pin (18) and respectively said third movement transmission pin (20) which, being engaged in said vertical section (19b) of said second slot (19) and respectively in said vertical section (21b) of said third slot (21), are not able to transfer vertical forces respectively to the driving plate (3) and to the driven plate (4), said configuration further including said locking pin (33) of said driven plate (4) and respectively said locking pin (31) of said driving plate (3) which, being engaged with said vertical wall (34a) of said recess (34) of said first hook latch (5) and respectively with said vertical wall (32a) of said recess (32) of said second hook latch (6), are not able to transfer vertical forces to the driving plate (3) and respectively to the driven plate (4).

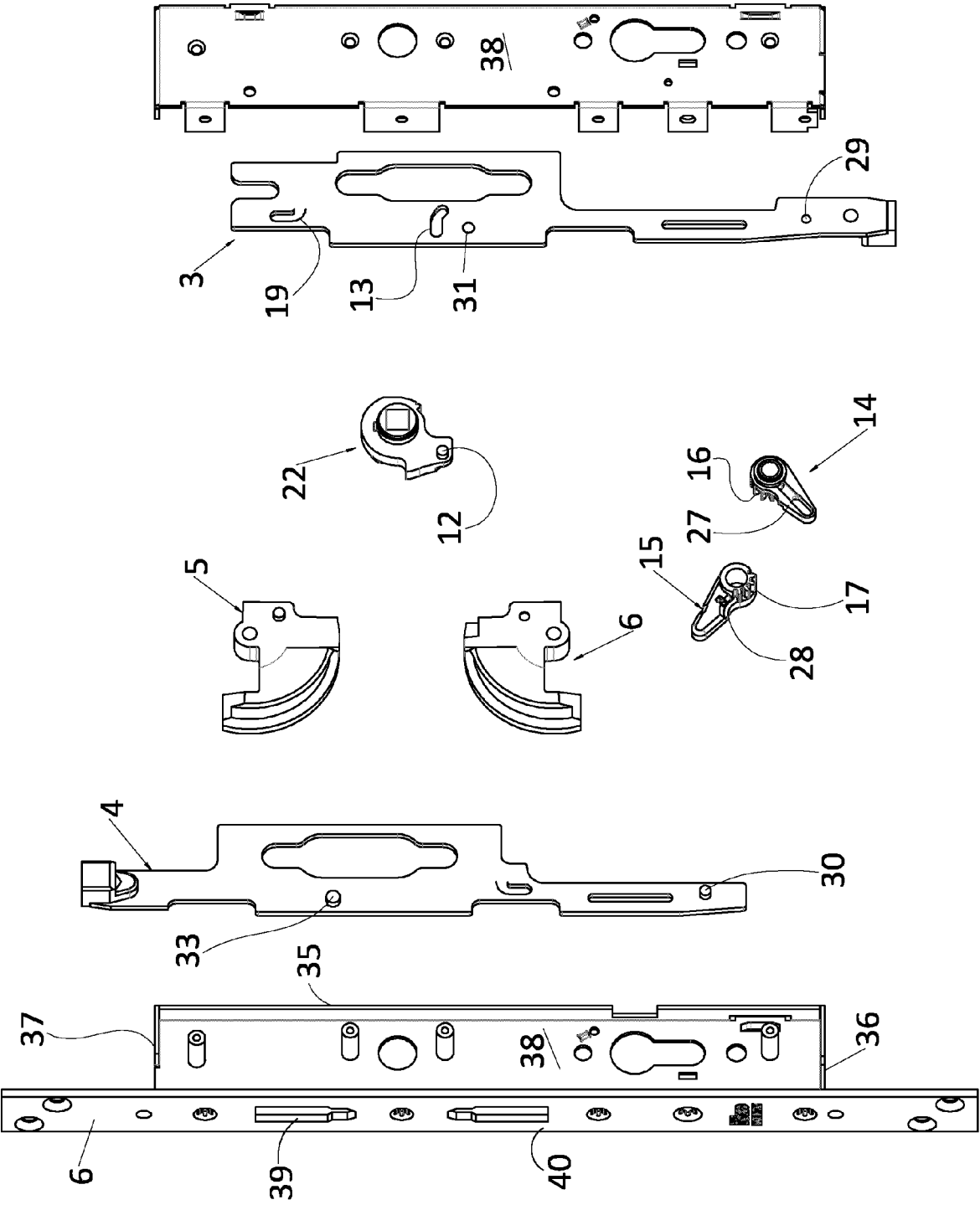


Fig 1

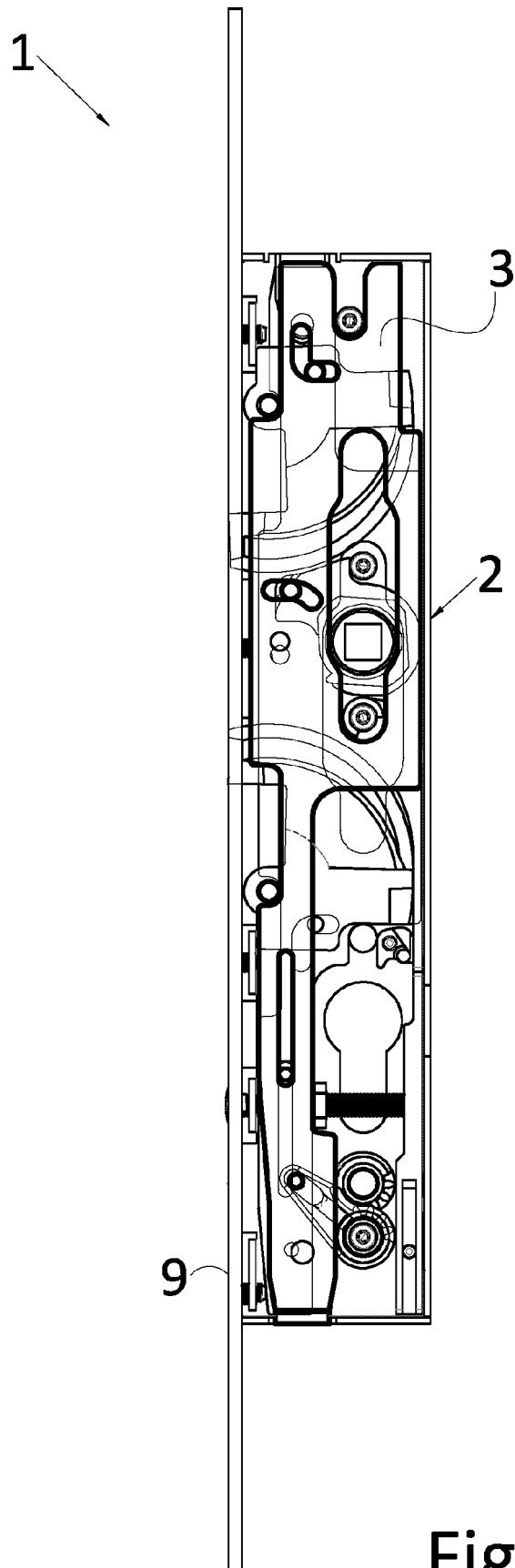
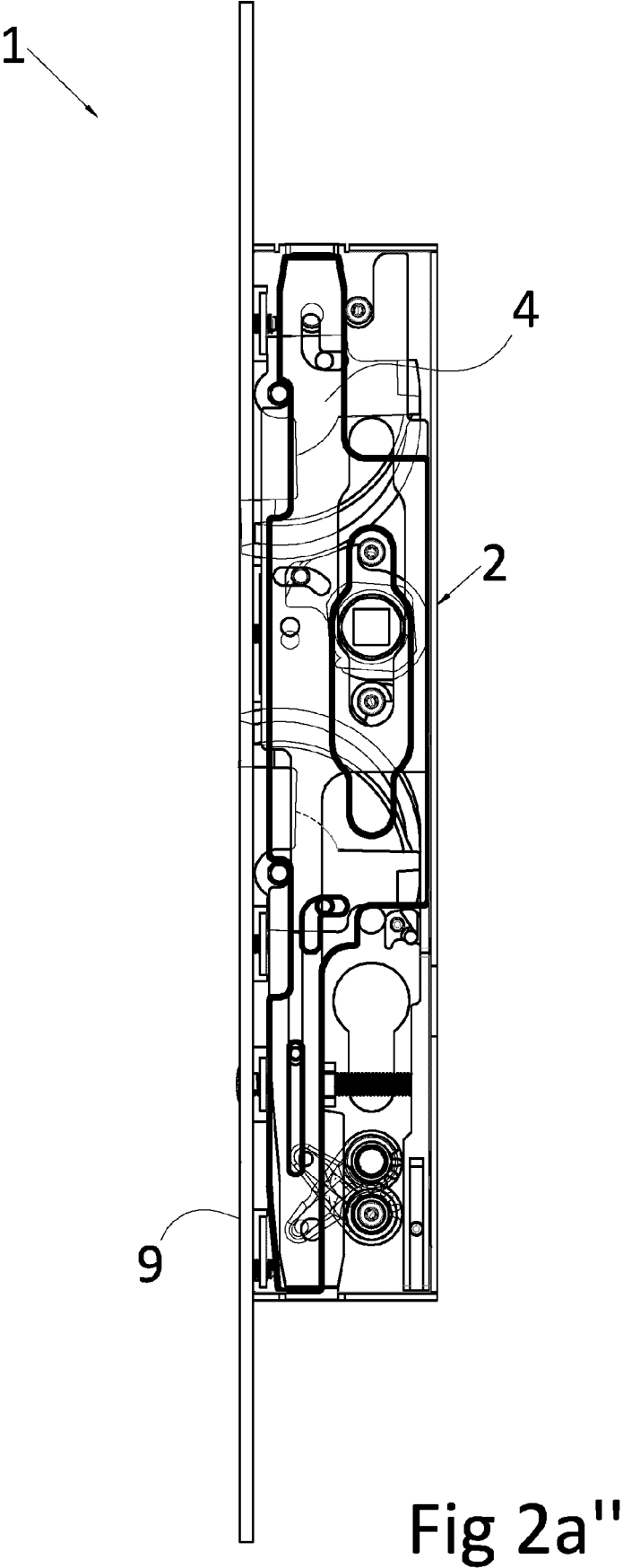


Fig 2a'



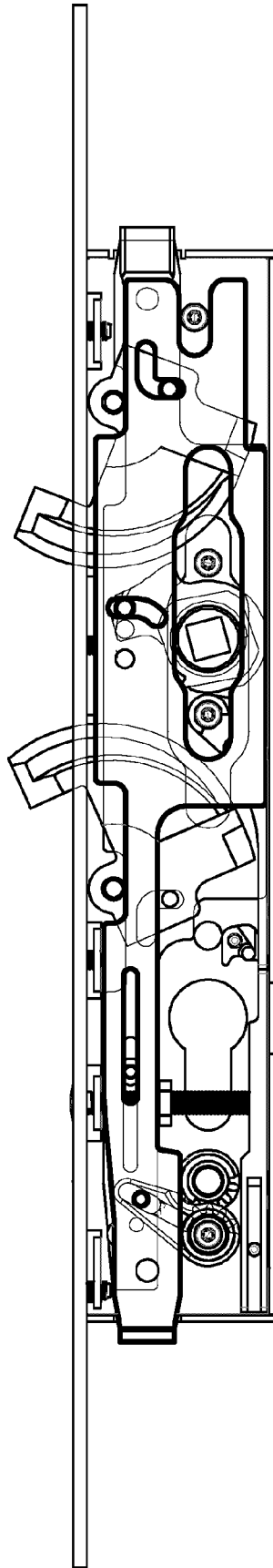


Fig 2b'

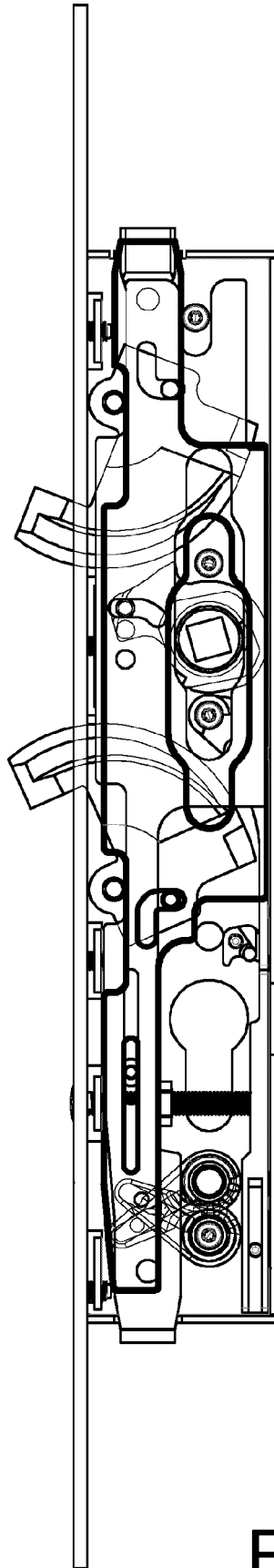


Fig 2b''

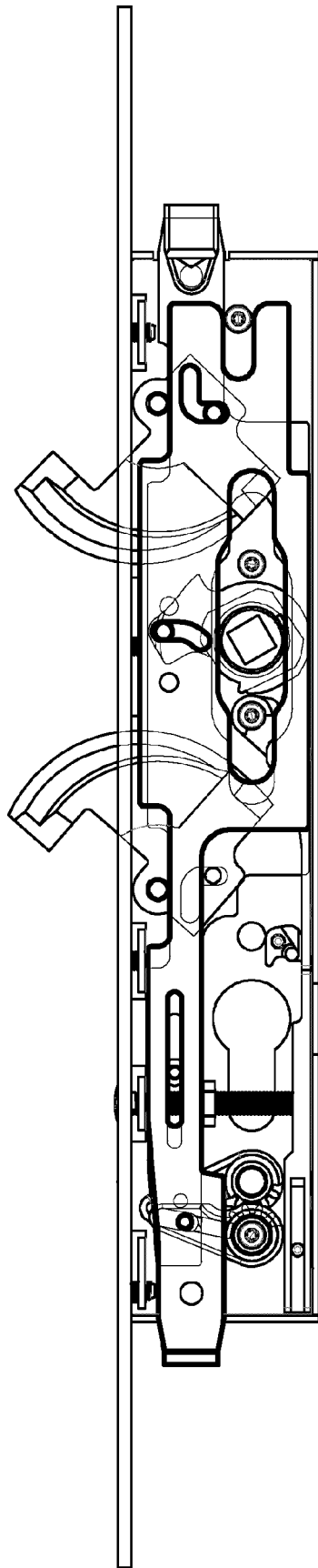


Fig 2c'

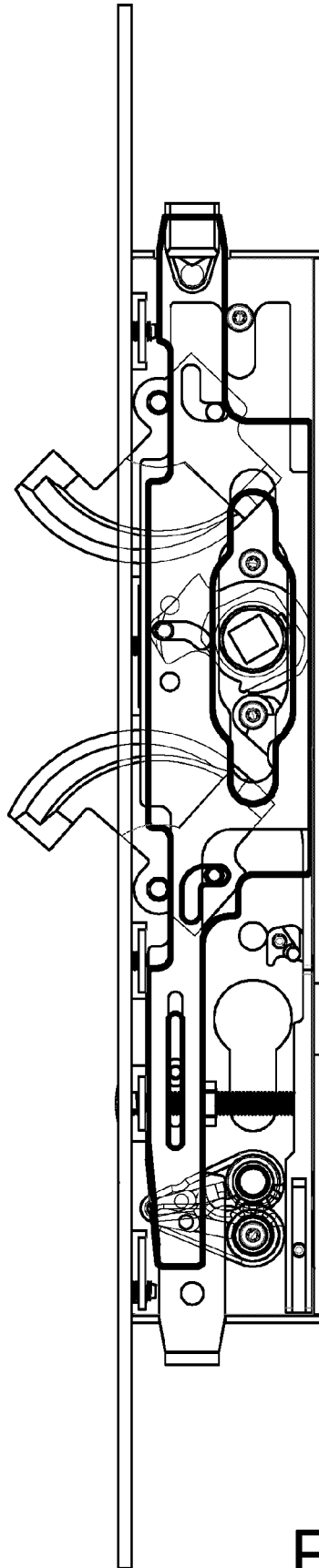
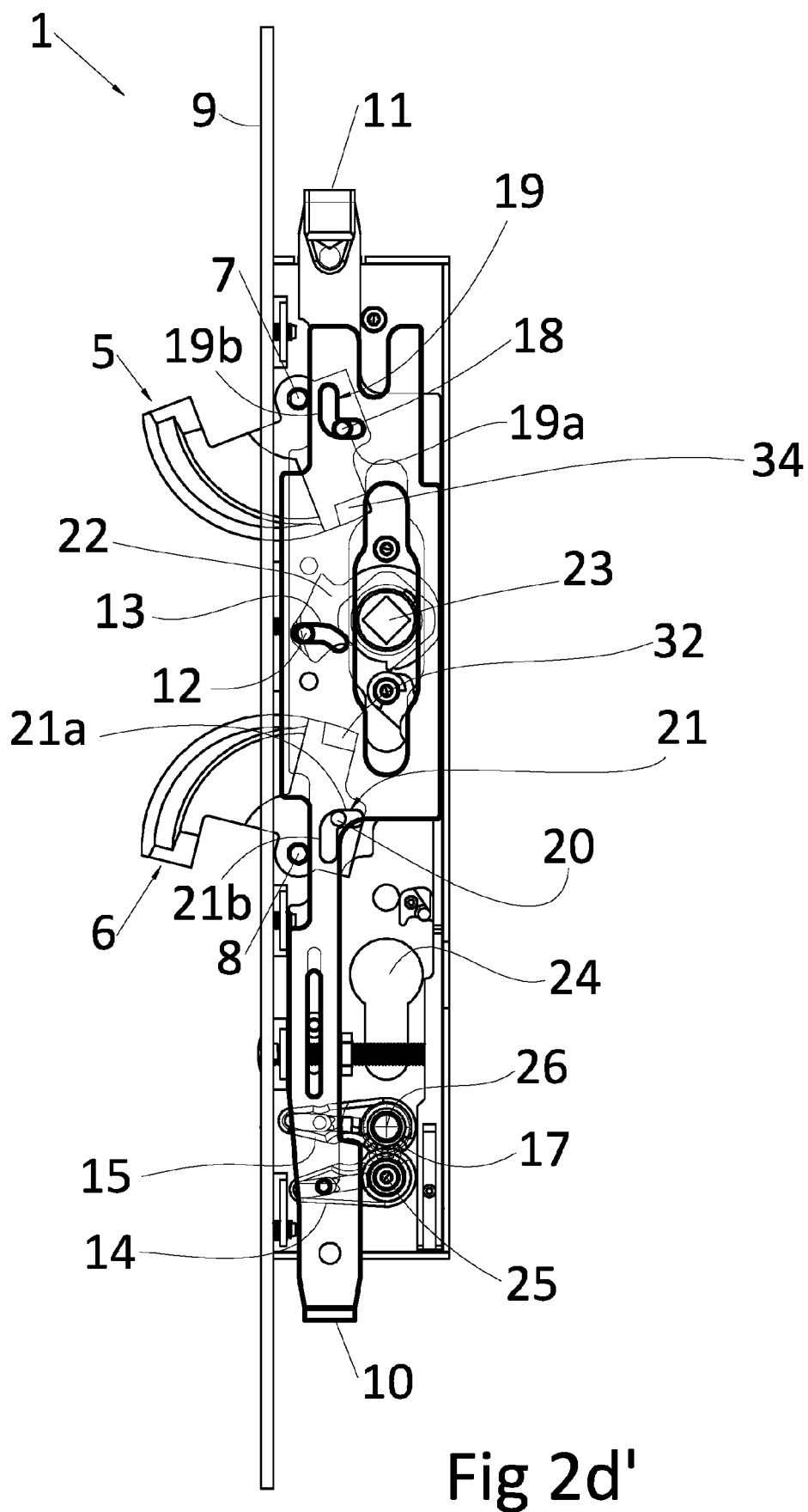
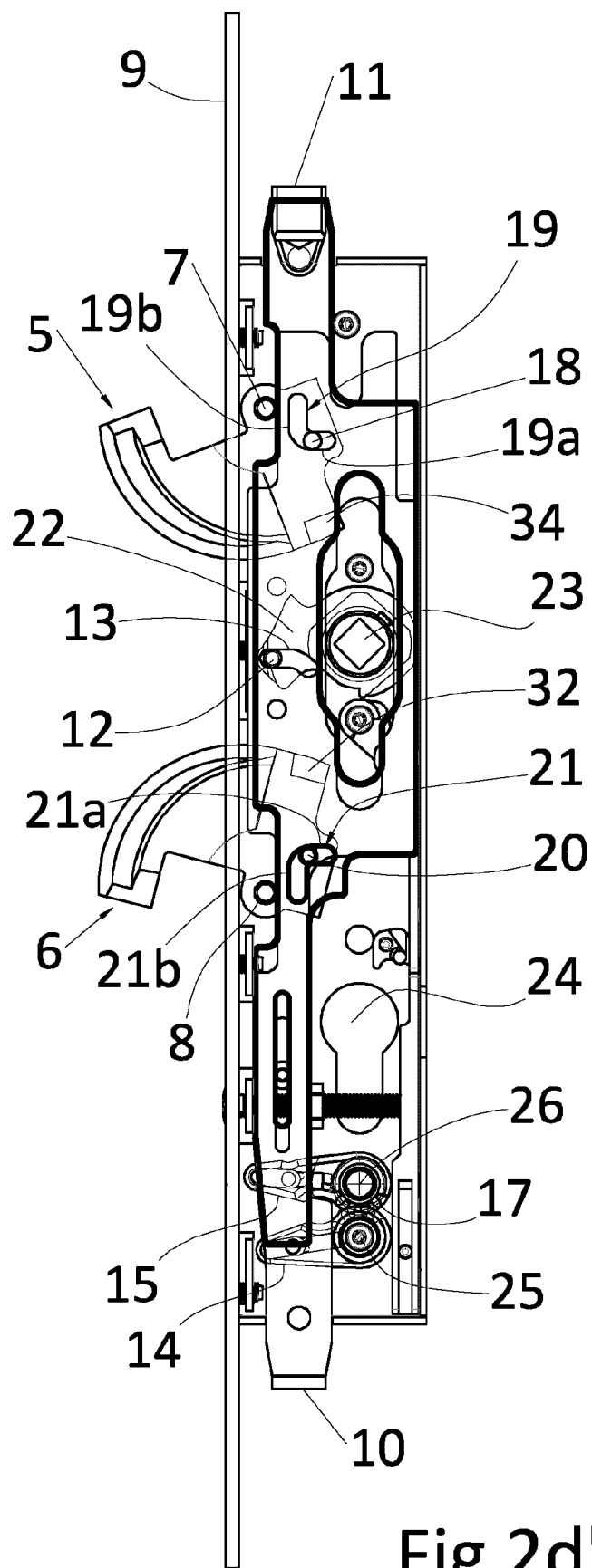


Fig 2c''





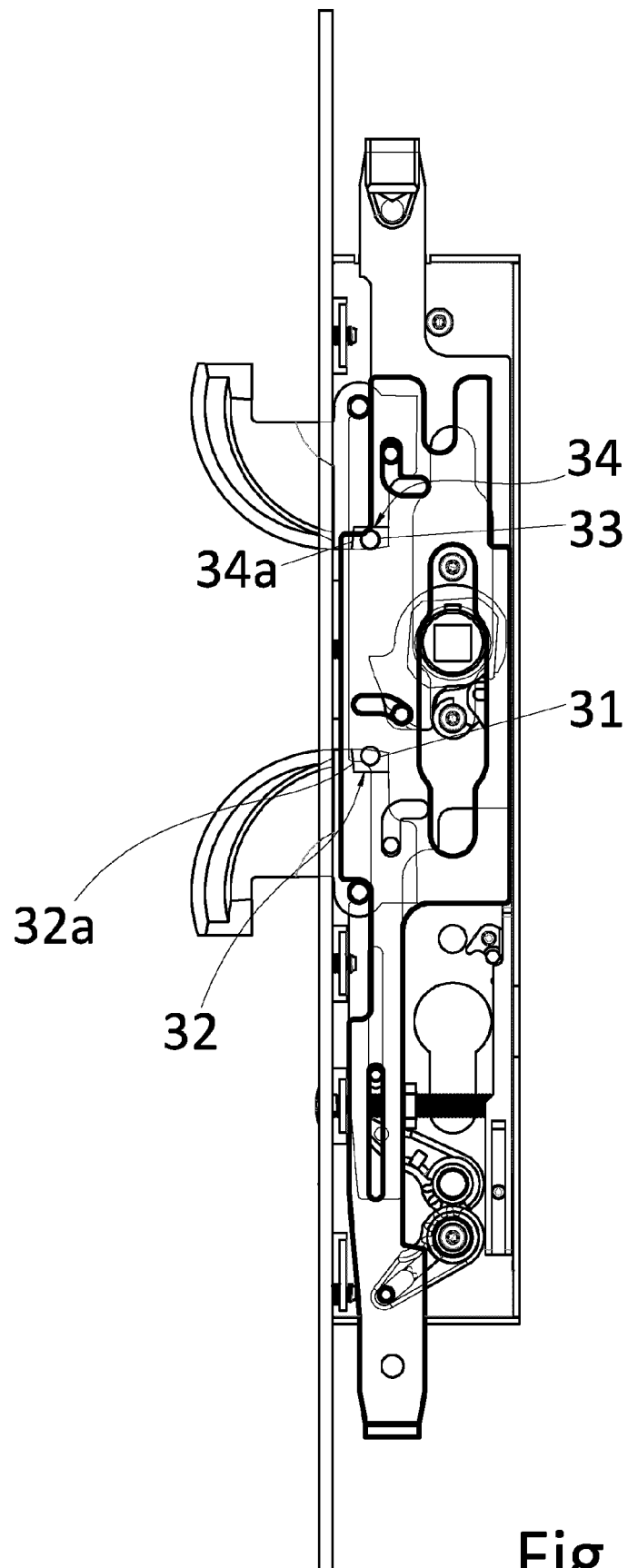


Fig 2e'

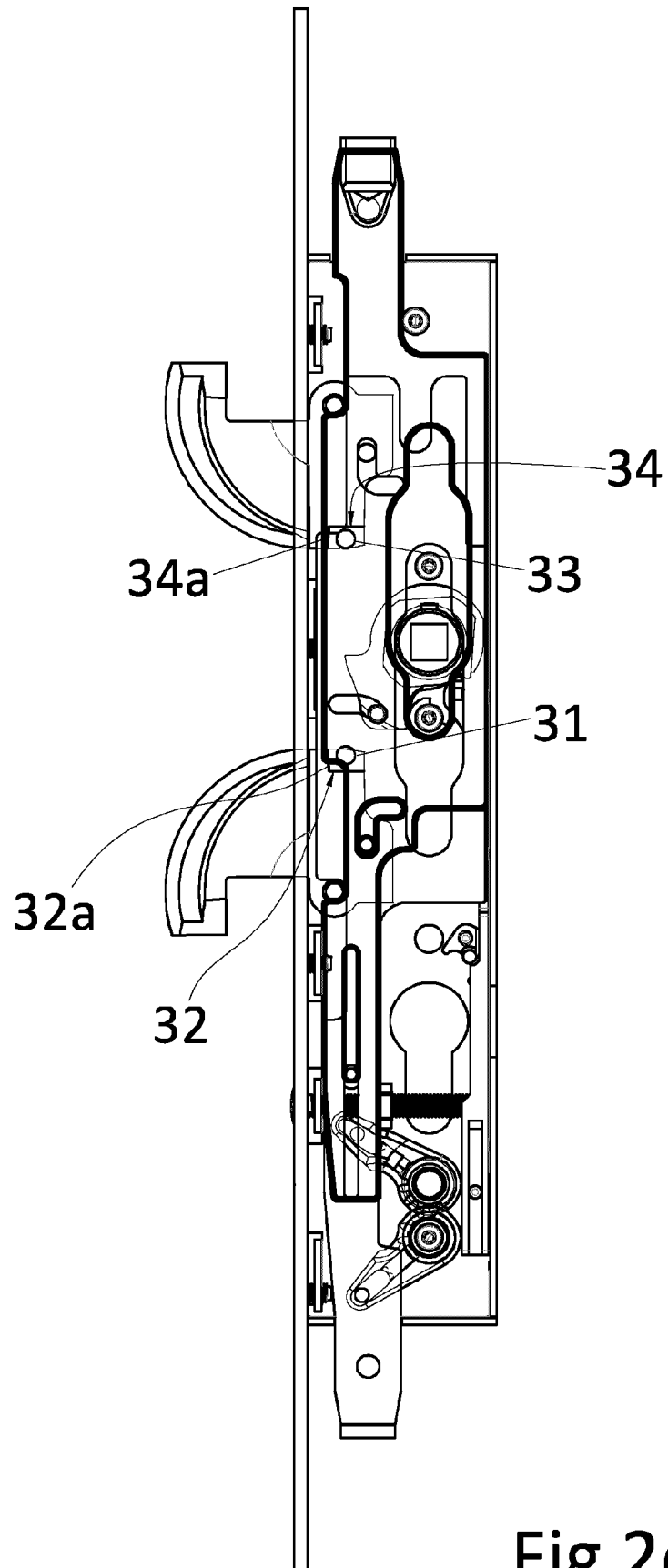


Fig 2e''



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Application Number

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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			
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