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## (54) MORTISE LOCK ASSEMBLY

(57) The invention relates to a mortise lock assembly comprising a housing (4) that houses an internal mechanism (5), wherein the housing is provided with an input opening (42) for mechanically coupling an externally mounted, manual operating member (31, 32) to the internal mechanism, wherein the mortise lock assembly further comprises a dead bolt (12) that is mechanically coupled to the internal mechanism inside the housing through an output opening (46), wherein the internal mechanism is arranged for mechanical conversion of the manual operation of the manual operating member into extension or retraction of the dead bolt via a mechanical conversion path between the input opening and the output opening, wherein the internal mechanism comprises a first mechanical component that is provided with a break zone (64, 173, 264, 364), wherein the first mechanical component is arranged to break at the break zone to interrupt the mechanical conversion path between the input opening and the output opening.

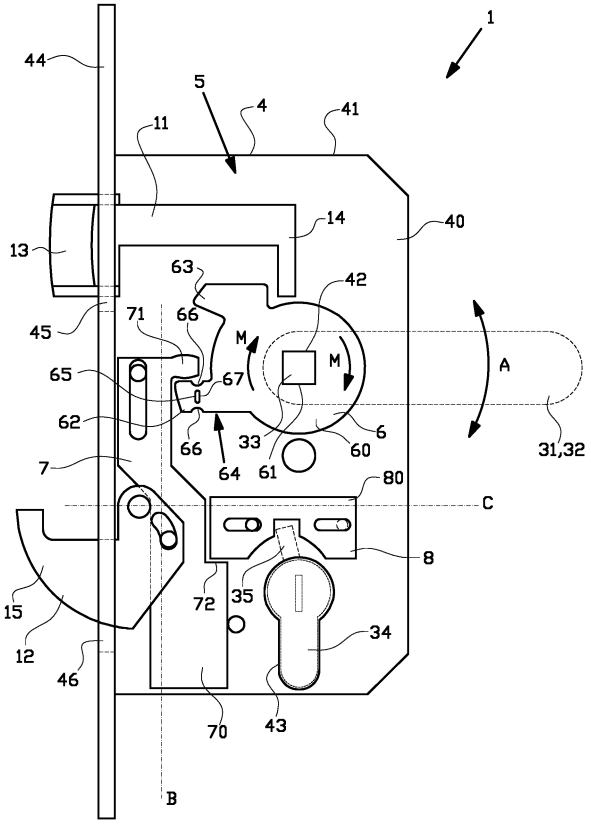


FIG. 1

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## Description

### BACKGROUND

**[0001]** The invention relates to a mortise lock assembly for mounting in a door or a window.

**[0002]** Known mortise lock assemblies are placed in a pocket or mortise in a door or a window for locking and unlocking said door or window with respect to an associated frame. The mortise lock assembly comprises a housing that houses an internal mechanism for operation of a latch and a dead bolt. An external handle or knob engages with the internal mechanism to operate the latch. Some internal mechanisms allow for simultaneous handle operation of both the latch and the dead bolt. Lock assemblies comprising such internal mechanisms are known as panic locks.

**[0003]** US 8,267,442 B2 discloses a panic exit door lock mounted in a door and an outer operational device including a cover that is mounted to a side of the door. A handle engages with an actuating member in the cover, which in turn is linked to a wing of a driving member in the cover, e.g. a follower. The driving member is operationally coupled to a latch of the door lock via a driving rod so that rotation of the handle causes retraction of the latch. The wing of the follower is arranged to break under excessive force applied to the handle. Thereafter, the handle can rotate freely to avoid damage to the outer operational device.

**[0004]** Although the door lock according to the above-mentioned US patent can no longer be operated with the handle, it will still be possible to forcibly remove the outer operational device, thereby exposing the driving rod of the door lock. With the right tools, one could still operate the door lock by manipulation of the driving rod or other exposed parts of the door lock.

**[0005]** It is an object of the present invention to provide a mortise lock assembly that prevents manipulation of the mortise lock assembly in the event of an excessive force applied to the handle.

### SUMMARY OF THE INVENTION

**[0006]** The invention provides a mortise lock assembly for mounting in a door or a window, comprising a housing that houses an internal mechanism, wherein the housing is provided with an input opening for receiving and mechanically coupling a driving member of an externally mounted, manual operating member to the internal mechanism, wherein the mortise lock assembly further comprises a dead bolt that is mechanically coupled to the internal mechanism inside the housing through an output opening for extension out of and retraction into the housing through said output opening, wherein the internal mechanism is arranged for mechanical conversion of the manual operation of the manual operating member into extension or retraction of the dead bolt via a mechanical conversion path between the input opening and the output opening, wherein the internal mechanism comprises a plurality of mechanical components arranged in the mechanical conversion path, wherein the plurality of mechanical components comprises a follower that is arranged to be coupled directly to the driving member, wherein a first mechanical component in the form of the follower or another component of the plurality of mechanical components is provided with a break zone spaced apart from the coupling between the follower and the driving member, wherein the first mechanical component is arranged to break at the break zone to interrupt the mechanical conversion path between the input opening and the output opening.

**[0007]** When the mechanical conversion path is interrupted at the internal mechanism within the housing, at a distance spaced apart from the input opening, it can be prevented that one can still manipulate the internal mechanism through the input opening, e.g. by forcefully removing the manual operating member and associated covers.

**[0008]** In an embodiment the first mechanical component is arranged to engage a second mechanical component in the mechanical conversion path at a position spaced apart from the coupling between the first mechanical component and the driving member, wherein the first mechanical component is arranged to break at the break zone to terminate the engagement between the first mechanical component and the second mechanical component. Thus, the first mechanical component can shield the second mechanical component downstream in the mechanical conversion path from manipulation via the input opening.

**[0009]** In an embodiment the first mechanical component is arranged for breaking at the break zone without terminating the direct coupling between the follower and the driving member. The follower can thus still be operated, for example for releasing the latch when the dead bolt is unlocked.

**[0010]** In a preferred embodiment the first mechanical component is a follower. In particular, the follower is provided with a main body and a first cam projecting from the main body towards and interacting with the second mechanical component of the plurality of mechanical components, wherein the break zone is provided at the transition from the first cam to the main body. The first cam can thus be broken off, thereby interrupting the mechanical interaction and/or mechanical conversion between the follower and the second mechanical component.

**[0011]** In an embodiment the second mechanical component is a slider, wherein the slider is provided with a third cam for interacting with the first cam. The first cam and the third cam can be brought into contact for mechanical transfer between the slider and the follower. When the first cam is broken off, the follower can no longer interact with the third cam of the slider.

**[0012]** In an embodiment the mortise lock assembly further comprises a latch that is operationally coupled to

the internal mechanism, wherein the follower is provided with a second cam that is arranged to interact with the latch, wherein the follower, after breaking off the first cam at the break zone, is still rotatable to bring the second cam in contact with the latch. Thus, the latch can even be operated after the first cam has broken off, thereby keeping the mortise lock assembly operational in a case where the dead bolt is unlocked.

**[0013]** In an embodiment the thickness of the material of the first mechanical component is reduced at the break zone. In an alternative or further embodiment thereof the first mechanical component is provided with a neck portion at the break zone. In an alternative or further embodiment thereof embodiment the first mechanical component is provided with a through hole at the break zone. These features can locally reduce the structural integrity of the break zone, thereby improving control or predictability of the breaking.

**[0014]** In an embodiment a third mechanical component of the plurality of mechanical components is arranged for blocking the internal mechanism, wherein the first mechanical component is arranged to break at the break zone when a moment of force is applied to the manual operating member in a range up to approximately 75 Newton meter while the internal mechanism is blocked. Preferably, the first mechanical component is arranged to break at the break zone when a moment of force is applied to the manual operating member in a range of approximately 50 to 70 Newton meter, preferably in a range of approximately 60 to 70 Newton meter while the internal mechanism is blocked. Within these ranges, the first mechanical component can break prior to the other mechanical components failing, deforming or breaking. Thus, damage to the internal mechanism, apart from the break at the first mechanical component, can be prevented.

**[0015]** In an embodiment the other of the plurality of mechanical components in the mechanical conversion path between the input opening and the output opening are arranged to fail, deform or break when a moment of force is applied to the manual operating member that is higher than 75 Newton meter while the internal mechanism is blocked. The first mechanical component can thus be distinguished over the other mechanical components in the same mechanical conversion path by its characteristic that it breaks earlier than the other mechanical components.

**[0016]** In an embodiment the housing is provided with a cylinder opening for receiving a lock cylinder with a rotatable cylinder cam, wherein the third mechanical component is arranged to be engaged and moved by the cylinder cam upon rotation of the cylinder cam between a blocking position for blocking the operation of the internal mechanism and a release position for releasing the operation of the internal mechanism. The internal mechanism of the mortise lock assembly can thus be blocked and released by turning a key.

**[0017]** In an embodiment the first mechanical component is a slider. In particular, the slider is provided with a main body and a third cam projecting from the main body towards and interacting with a third mechanical component of the plurality of mechanical components, wherein the break zone is provided at the transition from the third cam to the main body. The third cam can thus be broken off, thereby interrupting the mechanical interaction and/or mechanical conversion between the slider and the third mechanical component.

**[0018]** In an embodiment the third mechanical component is a follower, wherein the follower is provided with a first cam for interacting with the third cam. The first cam and the third cam can be brought into contact for mechanical transfer between the slider and the follower. When the third cam is broken off, the slider can no longer interact with the first cam of the follower.

**[0019]** In a preferred embodiment the slider is arranged to be coupled directly to the dead bolt.

**[0020]** In an embodiment the first mechanical component comprises a break pin. A break pin can be used to terminate the coupling between the first mechanical component and the second mechanical component.

**[0021]** In an embodiment the first mechanical component comprises a circular inner body and an outer body that is rotatable about the inner body, wherein the break pin is arranged to rotationally fixedly couple the outer body to the inner body. Thus, after breaking the break pin, the inner body can be freely rotated within the outer body, without imposing its rotation on the outer body.

**[0022]** In an embodiment the mortise lock assembly is a panic mortise lock assembly, further comprising a latch that is operationally coupled to the internal mechanism, wherein the internal mechanism is arranged for converting the manual operation of the manual operating member into extension or retraction of both the latch and the dead bolt. The mortise lock assembly can thus be easily opened by a single manual operation of the manual operating member.

**[0023]** In an embodiment the manual operating member is a handle or knob. A handle or knob can be used to more easily exert the required force on the unblocked internal mechanism to open the mortise lock assembly. The same handle or knob can however also be used to manipulate the blocked internal mechanism by exerting excessive force on the handle or knob.

**[0024]** In an embodiment the internal mechanism is fully comprised within the housing. The housing can thus effectively shield the internal mechanism, such that one can not easily manipulate the internal mechanism from the outside.

**[0025]** The various aspects and features described and shown in the specification can be applied, individually, wherever possible. These individual aspects, in particular the aspects and features described in the attached dependent claims, can be made subject of divisional patent applications.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0026]** The invention will be elucidated on the basis of an exemplary embodiment shown in the attached schematic drawings, in which:

figure 1 shows a side view of a lock assembly according to a first embodiment of the invention;
figure 2 shows a side view of a lock assembly according to a second embodiment of the invention;
figure 3 shows a side view of a lock assembly according to a third embodiment of the invention;
figure 4 shows a side view of a lock assembly according to a fourth embodiment of the invention; and
figure 5 shows a front view of the placement of the lock assembly according to figure 1 in a door or a window.

## DETAILED DESCRIPTION OF THE INVENTION

**[0027]** Figures 1 and 5 a mortise lock assembly 1 according to a first embodiment of the invention. The mortise lock assembly 1 comprises a casing or housing 4 that houses an internal mechanism 5.

**[0028]** As shown in figure 5, the mortise lock assembly 1 is arranged to be securely mounted internally or within the thickness T of a window or a door 91, in particular in a dedicated pocket or mortise 92 that is purposely cut-out in the window or the door 91 for receiving the mortise lock assembly 1. The mortise lock assembly 1 is provided with a latch 11 and a dead bolt 12 which are actuated by the internal mechanism 5 for extension towards and retraction away from a strike plate or strike box at a respective window or door frame (not shown). In this exemplary embodiment, the latch 11 is provided with a head 13 and tail 14 which are known per se. The dead bolt 12 has the form of a rotatable hook 15, which is also known per se. The dead bolt 12 may also be a translatable dead bolt, known per se. The dead bolt 12 can only be retracted into the mortise lock assembly 1 when the retraction functionality thereof has been enabled, either by unblocking or direct retraction through key operation. Window or door furniture in the form of covers 21, 22 are mounted externally on opposite surfaces or sides of the window or door 91, and are provided with manual or keyless operating members 31, 32 in the form of knobs or handles or a combination thereof, for manual operation of the mortise lock assembly 1. The manual operating members 31, 32 are provided with a driving member 33, in this example in the form of a square bar, rod or spindle, for operationally coupling the manual operating members 31, 32 to the mortise lock assembly 1 inside the window or door 91.

**[0029]** The housing 4 comprises two metal halves, only one of which is shown in figures 1, 2 and 3 to expose the internal mechanism 5. Together, the two halves substantially shield the internal mechanism 5 from unauthorized access. Each half comprises a sidewall 40 with a substantially rectangular outer contour 41. Apart from some beveled corners, the contour 41 is substantially rectangular. The housing 4 is provided with an input opening 42 in each sidewall 40 for allowing the operational coupling, e.g. by insertion of the driving member 33, between the manual operating members 31, 32 and the internal mechanism 5. The housing 4 further comprises a cylinder opening 43 in each sidewall 40 for allowing the insertion of a cylinder 34. The housing 4 may further be provided with some minor openings in the sidewalls 40 for assembly purposes.

**[0030]** As shown in figure 5, the housing 4 has a thickness X that is less than the thickness T of the window or door 91 in which it is to be mounted. Generally, the door or window thickness T is in the range of approximately 38 to 55 millimeters, while the housing 4 typically has a thickness that is in the range of approximately 15 to 35 millimeters. The housing 4 is normally mounted symmetrically within the thickness T of the window or door 91, with equal thicknesses remaining on both sides of the mortise lock assembly 1.

**[0031]** As shown in figure 5, the mortise lock assembly 1 is provided with a front plate 44 at the front of the housing 4. The front plate 44 comprises a first output opening 45 and a second output opening 46 for allowing extension out the housing 4 and retraction into the housing 4 of the latch 11 and the dead bolt 12, respectively.

**[0032]** As shown in figure 1, the internal mechanism 5 comprises a plurality of mechanical components mutually linked or interacting for the mechanical transfer or mechanical conversion of the operation of manual operating members 31, 32 into retraction of the latch 11 and/or the dead bolt 12 along a mechanical conversion path, chain or trajectory. In this example, the plurality of mechanical components comprises a follower 6, a slider 7 and a blocking member 8.

**[0033]** The follower 6 comprises a rotatable main body 60 with a central, square through hole 61 for receiving the driving member 33 from either of the manual operating members 31, 32. The rotatable main body 60 is rotatable together or in unison with the driving member 33 and the manual operating members 31, 32 in a direction of rotation A. The follower 6 is provided with a first projection or cam 62 projecting towards the slider 7 and a second projection or cam 63 projecting towards the latch 11 for interaction with the tail 14 thereof.

**[0034]** The slider 7 comprises an elongate main body 70 which is movable in its elongate direction in a first direction of translation B. The slider 7 is operationally coupled to the dead bolt 12 for extending and retracting the dead bolt 12 upon translation of the slider 7. The slider 7 is provided with a third projection or cam 71 projecting towards the follower 6 for interaction with the first cam 62 and a first blocking surface 72 facing in the first translation direction B for interaction with the blocking member 8.

**[0035]** The blocking member 8 comprises an elongate body 80 which is movable in its elongate direction in a

second direction of translation C transverse or perpendicular to the first direction of translation B. The blocking member 8 comprises a groove or recess 81 that is arranged to be engaged by a rotatable cylinder cam 35 of the cylinder 34 that is to be fitted in the cylinder opening 43. The blocking member 8 further comprises a second blocking surface 82 opposite to the first blocking surface 72 of the slider 7, arranged for blocking the movement of said slider 7 in the first direction of translation B. The position of the blocking member 8 in the second direction of translation C is controlled by placing a key into the cylinder 34 and turning the key such that the cylinder cam 35 displaces the blocking member 8 in the second direction of translation C. The blocking member 8 can thus be moved between a blocking position and an unblocking or release position. In the blocking position, as shown in figure 1, the blocking surfaces 72, 82 are opposite to each other in the first direction of translation B and, as a result, the blocking member 8 blocks movement of the slider 7 in the first direction of translation B. In the release position (not shown), the blocking member 8 is moved away from the slider 7 such that the blocking surfaces 72, 82 are not directly opposite in the first direction of translation B, thereby allowing translation of the slider 7 in the first direction of translation B.

**[0036]** In both cases, forces can be applied to the external manual operating members 31, 32, which forces are converted into a torque or moment of force M that is exerted via the driving member 33 onto the follower 6. With the blocking member 8 in the release position, the moment of force M can be freely converted into a rotation of the follower 6 in the rotational direction A. As the follower 6 rotates, the second cam 63 comes into contact with the tail 14 of the latch 11 and causes retraction of the head 13 of said latch 11 through the first output opening 45 into the housing 4. Simultaneously, the first cam 62 comes into contact with the third cam 71 and displaces the slider 7 in upwardly in the first direction of translation B. The slider 7 then causes the retraction of the dead bolt 12 through the second output opening 46 into the housing 4. The mortise lock assembly 1 is now unlocked and the window or door 91 may be opened.

**[0037]** Thus, with the blocking member 8 in the release position, the operation of the internal mechanism 5 is allowed or unblocked and the unlocking functionality of the mortise lock assembly 1 is enabled. In particular, it is noted that with the force applied to the operational members 31, 32 both the latch 11 and the dead bolt 12 can be retracted, preferably simultaneously. The mortise lock assembly 1 can therefore be classified as a panic lock, allowing for easy unlocking, provided that the unlocking functionality is enabled.

**[0038]** The situation is different when the blocking member 8 is in the blocking position as shown in figure 1. In that case, the slider 7 is no longer movable in the first direction of translation B and the follower 6 will not be rotatable or only minimally until the first cam 62 comes into contact with the third cam 71 of the stationary slider 7. The dead bolt 12 can thus not be retracted. Additionally, the second cam 63 will not be rotated into contact with and/or retract the tail 14 of the latch 11. The manual operating members 31, 32, coupled to the follower 6 via the driving member 33, will also not be rotatable. The operation of the internal mechanism 5 is thus blocked and the unlocking functionality of the mortise lock assembly 1 is disabled. The mortise lock assembly 1 remains locked.

**[0039]** Despite the blocked state of the internal mechanism 5, one could still apply excessive force to either one of the manual operating members 31, 32, in an attempt to forcibly manipulate the mortise lock assembly 1 into the unlocked state. The mortise lock assembly 1 according to the first embodiment of the invention is specifically adapted to this situation, in a manner that will be described more in detail below.

**[0040]** As shown in figure 1, the follower 6 is provided with a break zone, break connection, target break zone or target break connection 64 at the transition of the first cam 62 to the main body 60. In particular, the break connection 64 is created by weakening, reduction of the material thickness and/or reduction of the structural integrity of the transition from of the first cam 62 to the main body 60. As shown in figure 1, the first cam 62, at the base thereof towards the main body 60, is provided with a neck portion 65, flanked by two indentations 66 and further weakened by a through hole 67. The break connection 64 is adapted to predictably break or break in a controlled manner at a target or threshold moment of force M being exerted on the follower 6 below or in a range up to 75 Newton meter, in particular in a range of 50 to 70 Newton meter, and most preferably in a range of 60 to 70 Newton meter, while the internal mechanism 5 is blocked. The latter is roughly equivalent to a force of 3000 to 3500 Newton (approximately 300 to 350 kilos) being applied to the tip of a 20 centimeter long handle. Above 75 Newton meter, other parts of the internal mechanism 5 may start to deform or fail unpredictably, in contrast to the predictable breaking of the break connection 64. In addition, the driving member 33 will typically start to twist or wrench at moments of force in excess of 75 Newton meter. Once the first cam 62 has broken of the main body 60 of the follower 6, the follower 6 is no longer able to interact with the third cam 71 of the slider 7. Thus, the operational members 31, 32, the driving member 33 and/or the follower 6 can not be manipulated to retract the dead bolt 12. The follower 6 may still be rotated in the rotational direction A until its second cam 63 is in contact with the tail 14 of the latch 11, which may thus still be retracted. However, with the dead bolt 11 extended, the mortise lock assembly 1 remains locked.

**[0041]** Thus, in effect, the break connection 64 has broken or interrupted the chain or path of the mechanical conversion or mechanical transfer between the rotational input of the externally mounted operational members 31, 32 and the driving member 33 at the housing 4 and the output in the form of the manipulation or retraction of the

dead bolt 12 at the front plate 44 of the housing 4. As the break occurs on the inside of the housing 4, between the input and output of the mechanical transfer with respect to said housing 4, the shielding of the internal mechanism 5 by the housing prevents to manipulation of the retraction of the dead bolt 12, at least at or via the original input of the mechanical transfer at the input opening 42.

**[0042]** Figure 2 shows an alternative mortise lock assembly 101 according to a second embodiment of the invention. Most of parts of the alternative mortise lock assembly 101 correspond to the mortise lock assembly 1 as discussed above in relation to figures 1 and 5. These corresponding parts have been given the same reference numerals.

**[0043]** The alternative mortise lock assembly 101 according to figure 2 differs from the aforementioned mortise lock assembly 1 in that it is provided with an alternative follower 106 and an alternative slider 107. Both are again provided with a first cam 162 and a third cam 171, respectively. However, contrarily to the first cam 162 being provided with a break connection 64 as in figure 1, the first cam 162 in figure 2 is not weakened and will not break in the specified range. Instead, the third cam 171 is now provided with a break zone or connection 173 that is weakened, reduced in thickness or provided with a reduced structural integrity in a similar way to the break connection 64 in figure 1. The break connection 173 in the third cam 171 is also arranged to break at a threshold moment of force M being exerted to the alternative follower 106 in the same range as specified before.

**[0044]** Figure 3 shows a further alternative mortise lock assembly 201 according to a third embodiment of the invention. Most of parts of the further alternative mortise lock assembly 201 correspond to the mortise lock assembly 1 as discussed above in relation to figures 1 and 5. These corresponding parts have been given the same reference numerals.

**[0045]** The further alternative mortise lock assembly 201 according to figure 3 differs from the aforementioned mortise lock assembly 1 in that it is provided with a further alternative follower 206 and a further alternative slider 207. The further alternative follower 206 is again provided with a first cam 262. However, contrarily to the first cam 162 being provided with a break connection 64 as in figure 1, the first cam 262 in figure 3 is not weakened and will not break in the specified range. The further alternative follower 206 is provided with a circular inner body 267 and an outer body 268 concentrically arranged in a radially outer position around said inner body 267. The inside of the outer body 268 is circular to allow for rotation of the outer body 268 with respect to the inner body 267. The first cam 262 and the second cam 263 are provided on the outer body 268.

**[0046]** The further alternative slider 207 is provided with a bushing 271 that has the same function as the third cam 71 in figure 1 and the third cam 171 in figure 2 of interacting with the first cam 262. However, the bushing 271 is not weakened as the third cam 171 in figure 2 and will not break in the specified range. The break zone or connection is instead provided in the form of a break pin 264 that is provided between the inner body 267 and the outer body 268 of the further alternative follower 206. The break pin 264 rotationally fixedly couples the outer body 268 to the inner body 267, so as to rotate in unison with the inner body 267. The break pin 264 is provided with or forms a break zone that is arranged to break when a moment of force M is exerted on the further alternative follower 206 in the specified range. As the break pin 264 breaks, the coupling between the inner body 267 and the outer body 268 is terminated, and the rotation A of the inner body is no longer imposed on the outer body.

**[0047]** Figure 4 shows a further alternative mortise lock assembly 301 according to a fourth embodiment of the invention. Most of parts of the further alternative mortise lock assembly 301 correspond to the mortise lock assembly 1 as discussed above in relation to figures 1 and 5. These corresponding parts have been given the same reference numerals. The further alternative mortise lock assembly 301 according to figure 4 differs from the one in figure 1 in that it is provided with an alternative follower 306, again provided with a main body 60, a first cam 62 and a second cam 63. However, the alternative follower 306 is provided with a break zone, break connection, target break zone or target break connection 364 at the transition of both the first cam 62 and the second cam 63 to the main body 60. In particular, the target break connection 364 comprises a through hole 367 in the form of a slit that extends between the main body 60 and both cams 62, 63. The extended slit allows for breaking off or separation of both cams 62, 63 from the main body 60, such that no cam projects from the main body 60. Thus, it can be prevented that, after breaking off of one of the cams 62, 63, the remaining cam can still manipulate the slider 7.

**[0048]** It is to be understood that the above description is included to illustrate the operation of the preferred embodiments and is not meant to limit the scope of the invention. From the above discussion, many variations, as for example illustrated in figures 1, 2 and 3, will be apparent to one skilled in the art that would yet be encompassed by the spirit and scope of the present invention.

**[0049]** The variations have in common that the break zone or connection is provided in the internal mechanism 5, within the housing 4 of the mortise lock assembly 1, 101, 201, such that the chain or path of the mechanical conversion or mechanical transfer is arranged to broken or interrupted in a controlled manner in the specified range between the input and the output of the mechanical conversion with respect to the housing 4. It will be apparent that the break zone or connection may be provided in other components in the internal mechanism 5 which are in the path of the mechanical transfer between the manual operating members 31, 32 and the dead bolt 12.

**[0050]** In summary, the invention relates to a mortise lock assembly comprising a housing that houses an internal mechanism, wherein the housing is provided with

an input opening for mechanically coupling an externally mounted, manual operating member to the internal mechanism, wherein the mortise lock assembly further comprises a dead bolt that is mechanically coupled to the internal mechanism inside the housing through an output opening, wherein the internal mechanism is arranged for mechanical conversion of the manual operation of the manual operating member into extension or retraction of the dead bolt via a mechanical conversion path between the input opening and the output opening, wherein the internal mechanism comprises a first mechanical component that is provided with a break zone, wherein the first mechanical component is arranged to break at the break zone to interrupt the mechanical conversion path between the input opening and the output opening.

## Claims

1. Mortise lock assembly for mounting in a door or a window, comprising a housing that houses an internal mechanism, wherein the housing is provided with an input opening for receiving and mechanically coupling a driving member of an externally mounted, manual operating member to the internal mechanism, wherein the mortise lock assembly further comprises a dead bolt that is mechanically coupled to the internal mechanism inside the housing through an output opening for extension out of and retraction into the housing through said output opening, wherein the internal mechanism is arranged for mechanical conversion of the manual operation of the manual operating member into extension or retraction of the dead bolt via a mechanical conversion path between the input opening and the output opening, wherein the internal mechanism comprises a plurality of mechanical components arranged in the mechanical conversion path, wherein the plurality of mechanical components comprises a follower that is arranged to be coupled directly to the driving member, wherein a first mechanical component in the form of the follower or another component of the plurality of mechanical components is provided with a break zone spaced apart from the coupling between the follower and the driving member, wherein the first mechanical component is arranged to break at the break zone to interrupt the mechanical conversion path between the input opening and the output opening.

2. Mortise lock assembly according to claim 1, wherein the first mechanical component is arranged to engage a second mechanical component in the mechanical conversion path at a position spaced apart from the coupling between the first mechanical component and the driving member, wherein the first mechanical component is arranged to break at the break zone to terminate the engagement between the first mechanical component and the second mechanical component.

3. Mortise lock assembly according to claim 1 or 2, wherein the first mechanical component is arranged for breaking at the break zone without terminating the direct coupling between the follower and the driving member.

4. Mortise lock assembly according to any one of the preceding claims, wherein the first mechanical component is the follower.

5. Mortise lock assembly according to claims 2 and 4, wherein the follower is provided with a main body and a first cam projecting from the main body towards and interacting with the second mechanical component of the plurality of mechanical components, wherein the break zone is provided at the transition from the first cam to the main body, wherein, preferably, the second mechanical component is a slider, wherein the slider is provided with a third cam for interacting with the first cam, wherein, preferably, the mortise lock assembly further comprises a latch that is operationally coupled to the internal mechanism, wherein the follower is provided with a second cam that is arranged to interact with the latch, wherein the follower, after breaking off the first cam at the break zone, is still rotatable to bring the second cam in contact with the latch.

6. Mortise lock assembly according to any one of the preceding claims, wherein the thickness of the material of the first mechanical component is reduced at the break zone.

7. Mortise lock assembly according to any one of the preceding claims, wherein the first mechanical component is provided with a neck portion or a through hole at the break zone.

8. Mortise lock assembly according to any one of the preceding claims, wherein a third mechanical component of the plurality of mechanical components is arranged for blocking the internal mechanism, wherein the first mechanical component is arranged to break at the break zone when a moment of force is applied to the manual operating member in a range up to approximately 75 Newton meter, preferably in a range of approximately 50 to 70 Newton meter and most preferably in a range of approximately 60 to 70 Newton meter, while the internal mechanism is blocked.

9. Mortise lock assembly according to claim 8, wherein the other of the plurality of mechanical components in the mechanical conversion path between the input opening and the output opening are arranged to fail,

deform or break when a moment of force is applied to the manual operating member that is higher than 75 Newton meter while the internal mechanism is blocked.

**10.** Mortise lock assembly according to claim 8 or 9, wherein the housing is provided with a cylinder opening for receiving a lock cylinder with a rotatable cylinder cam, wherein the third mechanical component is arranged to be engaged and moved by the cylinder cam upon rotation of the cylinder cam between a blocking position for blocking the operation of the internal mechanism and a release position for releasing the operation of the internal mechanism.

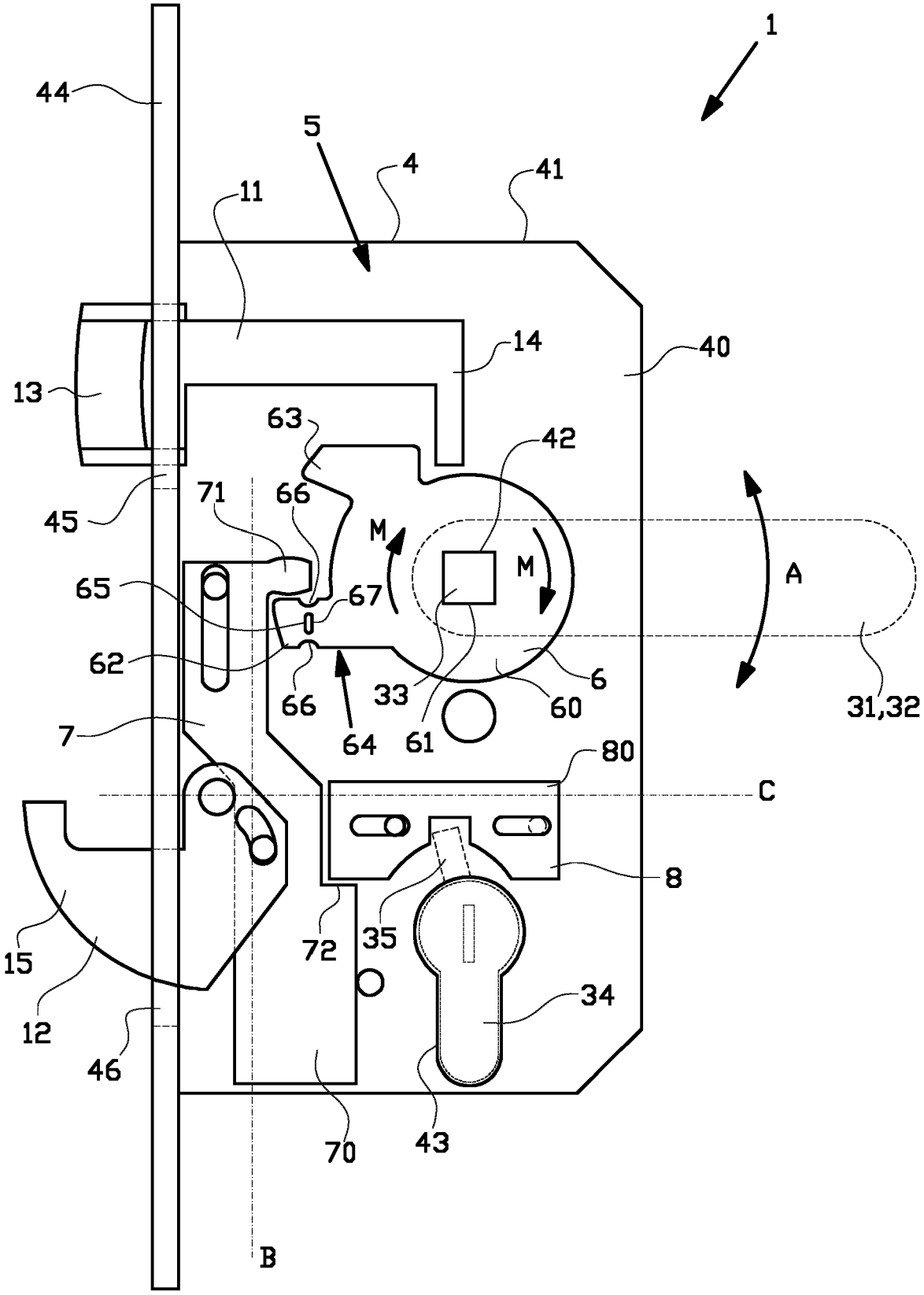
**11.** Mortise lock assembly according to claim 1, 2 or 3, wherein the first mechanical component is a slider, wherein, preferably, the slider is provided with a main body and a third cam projecting from the main body towards and interacting with the second mechanical component of the plurality of mechanical components, wherein the break zone is provided at the transition from the third cam to the main body, wherein, preferably, the second mechanical component is a follower, wherein the follower is provided with a first cam for interacting with the third cam.

**12.** Mortise lock assembly according to claim 11, wherein the slider is arranged to be coupled directly to the dead bolt.

**13.** Mortise lock assembly according to any one of claims 1-10, wherein the first mechanical component comprises a break pin, wherein, preferably, the first mechanical component comprises a circular inner body and an outer body that is rotatable about the inner body, wherein the break pin is arranged to rotationally fixedly couple the outer body to the inner body.

**14.** Mortise lock assembly according to any one of the preceding claims, wherein the mortise lock assembly is a panic mortise lock assembly, further comprising a latch that is operationally coupled to the internal mechanism, wherein the internal mechanism is arranged for converting the manual operation of the manual operating member into extension or retraction of both the latch and the dead bolt.

**15.** Mortise lock assembly according to any one of the preceding claims, wherein the manual operating member is a handle or knob.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33
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43
B

FIG. 1

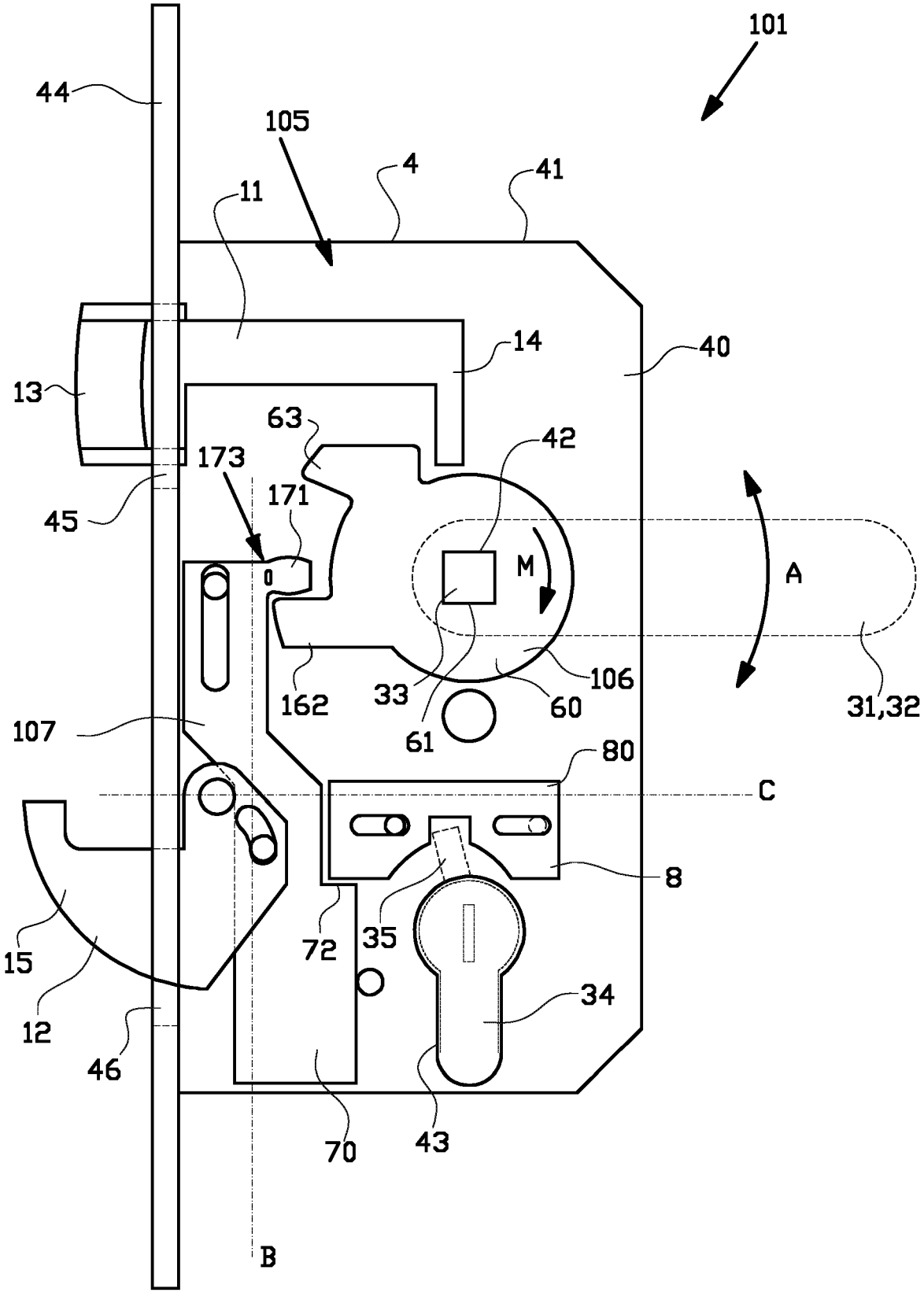
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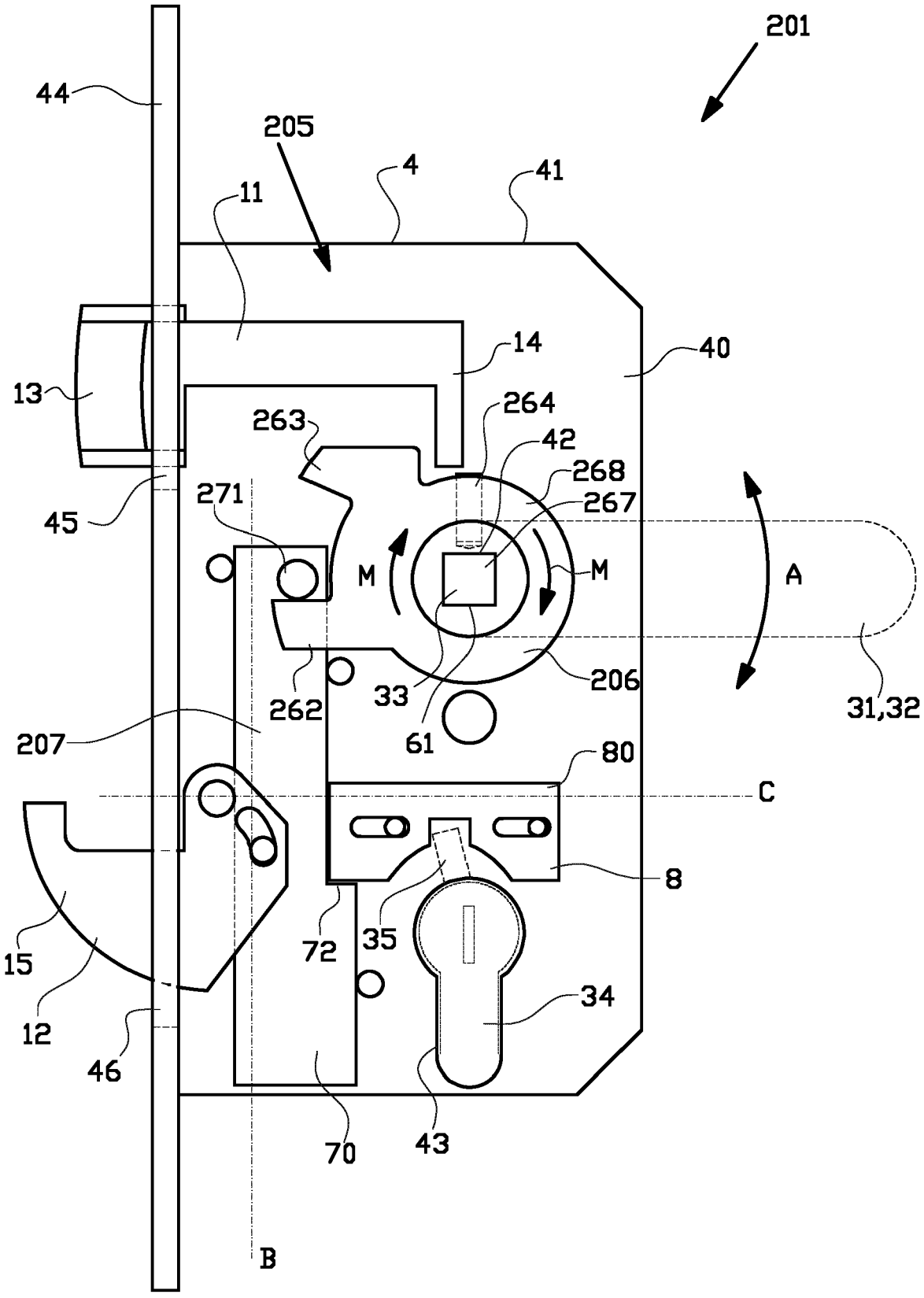
FIG. 2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B

FIG. 3

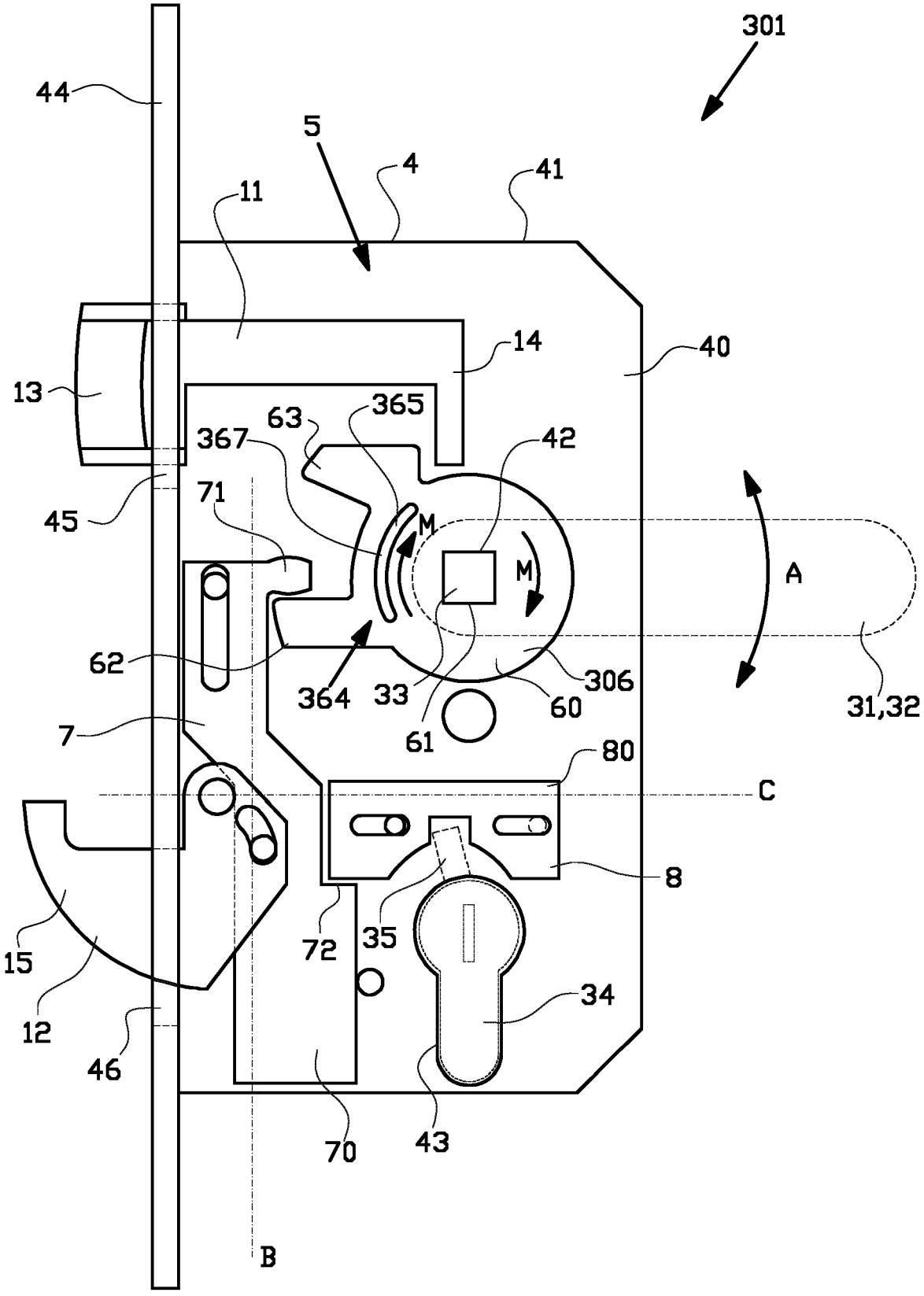
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FIG. 4

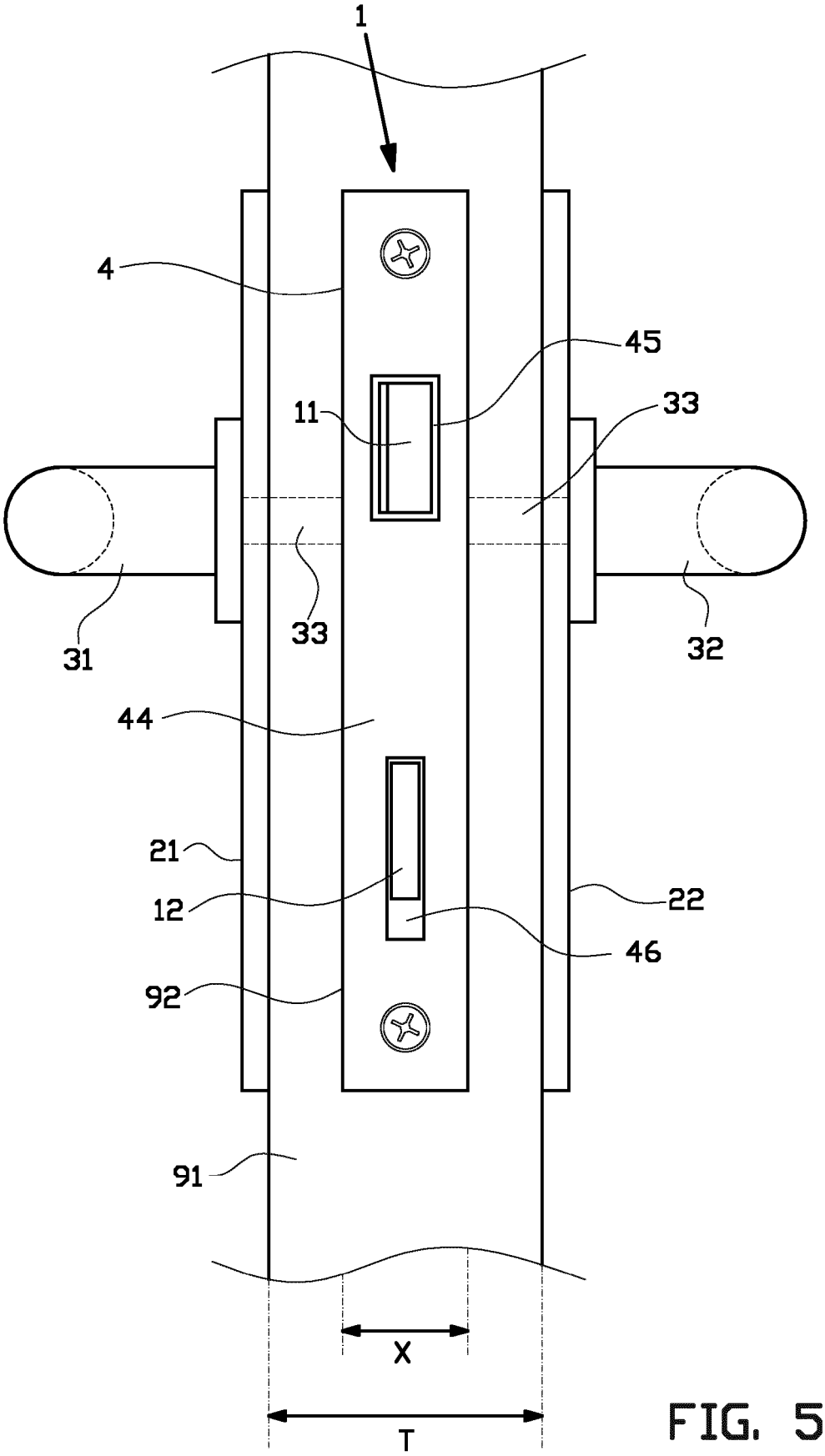


FIG. 5

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Application Number
EP 15 17 0505

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| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 12 January 2016 | Antonov, Ventseslav |

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