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(54) **LOCK WITH DEAD BOLT AND LATCH BOLT**

(57) Emergency or evacuation lock comprising a dead bolt (5) and a latch bolt (6). A first rotatable follower (10) is operably connected to the dead bolt (5) for moving the deadbolt between an extended dead locking position and a retracted releasing position. A second rotatable follower (20) is operably connected to the latch bolt (6) for retracting the latch bolt (6) from an extended latching position to a retraced releasing position. The lock also comprises a blocking device (40) which is operably connected to the first follower (10) and the second follower (20) and arranged to prevent retraction of the latch bolt (6) by rotation of the second follower (20) in a latch retracting direction when the dead bolt (5) is in its extended dead locking position.

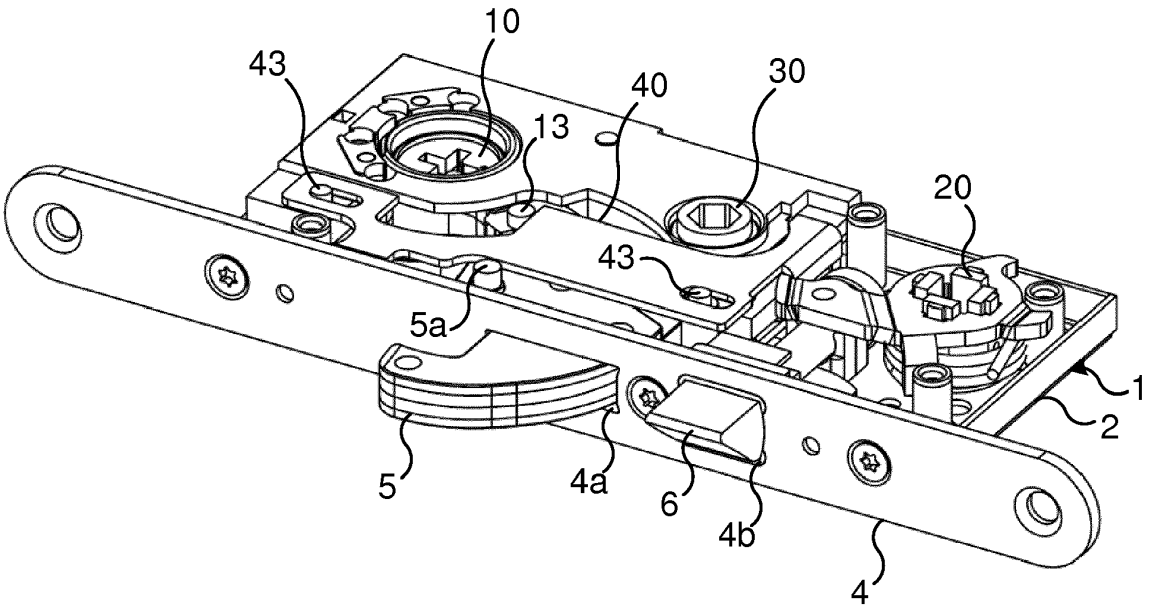

Fig. 1

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Description

Technical field

[0001] The invention relates to a lock comprising at least one dead bolt and at least one latch bolt. More specifically the invention relates to such a lock provided with a dead bolt, a latch bolt and two followers arranged for operating the bolts and intended to be operated by a respective fitting.

Background and prior art

[0002] At locks comprising more than one bolt which engage the striking plate, only one of the bolts is normally arranged to define the closed position of the door by bearing against the striking plate in the opening direction of the door. This bolt thus carries the load exerted by the compressible sealing normally arranged between the door and door frame. Sometimes this bolt is therefor referred to as the sealing pressure or sealing load carrying bolt of the lock.

[0003] Doors which require some kind of authorisation for being opened are normally provided with a lock which comprises at least one dead bolt which is operably connected to a dead bolt follower. The dead bolt follower is in turn connected to some kind of fitting or actuator which requires authorization for being actuated. Typically, this may be a lock cylinder which can be rotably operated only after insertion of a correct key. The dead bolt thus serves the purpose of locking and unlocking the door. Such locks normally also comprises at least one latch bolt, which constitutes the sealing load carrying bolt. The latch bolt is operably coupled to a latch bolt follower which in turn, in use, is connected to a manoeuvring fitting, such as a handle, a door knob or the like. By operating the handle it is possible to retract the latch bolt to its releasing position such that the door may be opened, as long as the dead bolt is not in its extended locking position. The purpose of the latch bolt is thus to define the closed position of the door and to allow opening and closing of the door when the lock is unlocked and the dead bolt retracted.

[0004] Since the dead bolt and latch bolt may be operated independently, by actuating respective fittings, it may happen that the latch bolt is retracted also when the dead bolt is in its extended, locking position. Naturally this will not result in an opening of the door. It may however result in that the sealing pressure or any other outwardly directed load on the door causes the door to be pivoted somewhat outwardly, until an outer side surface of the dead bolt makes contact with a corresponding surface of the striking plate. When this happens it will be the dead bolt instead of the latch bolt which absorbs the outwardly directed sealing load. Even though the resulting pivotal movement of the door may be small, it can still lead to that the latch bolt is brought out of alignment with the latch bolt receiving recess or aperture in the striking plate. Thus, even if the handle or other latch bolt operating fitting is brought back to the non-actuated position, it may happen that the latch bolt is prevented from re-entering its intended engagement with the striking plate.

[0005] This in turn results in that it is the dead bolt which absorbs the sealing load and any other outwardly directed load until the door has been unlocked, opened and closed again. Such load absorption of the dead bolt constitutes a problem since it will lead to friction between the dead bolt and the striking plate during retraction of the dead bolt. Typically and for security reasons, the dead bolt is larger than the latch bolt. The resulting friction between the dead bolt and the striking plate caused by the sealing load may therefor be considerable and greater than the intended friction between the latch bolt and the striking plate. Such unintended friction leads to problems in operating the lock and especially in unlocking it. For retracting the dead bolt, the retracting force applied to the dead bolt needs to exceed the frictional force acting on the dead bolt. This in turn requires that the torque applied to the dead bolt follower needs to be sufficiently high. Not only does this make it necessary to design the components of the lock sufficiently strong to withstand such forces and torques. It further requires that the torque applied eg. manually by rotating a key or by means of an electric motor for operating the dead bolt follower must be correspondingly high. In some cases, e.g. at key operated cylinders it may even lead to that a normally strong person is not able to manually apply a torque to the key which is sufficient for retracting the dead bolt and unlocking the lock. This of course constitutes a sever problem.

[0006] Further, emergency exit doors are often equipped with so-called emergency or panic exit fittings or accessories. Such fittings are disposed on the inner side of the door to allow quick and easy operation of the lock from the inside of the door, from which emergency exit through the door shall be allowed. The emergency doors are opened outwards and the fittings are configured and coupled to the bolts of the lock to allow the door to be opened with a simple thrust on an emergency handle or a panic opening bar.

[0007] Also these type of locks normally comprises at least one latch bolt defining the closed position of the door and intended to absorp the sealing load and aat least one dead bolt for allowing locking and unlocking of the door.

[0008] In panic situations, for example, where crowding occurs by the emergency door, it can happen that the crowd is pressed against the door before this has been opened. The pressure of the crowed on the inside of the door is thus added to the sealing load, whereby the load carrying bolt is pressed against the striking plate by an increased force, so that the friction between the bolt and striking plate increases. A greater force is hence needed to be applied to the emergency fitting in order to withdraw the load carrying bolt from its engagement with the striking plate. In order to prevent the need for excessively large forces to operate the fitting, there are safety regu-

lations which specify how large a maximum force on the actuation members of the fitting may be required to open the door when a certain pressure force is applied to the inner side of the door leaf. According to European safety regulations, for example, the necessary force upon a panic fitting to operate the lock must not exceed 220 N if a pressure force of 1000 N is applied centrally to the inner side of the door leaf.

[0009] In order to reduce the forces which need to be applied to the fitting in panic situations, it is previously known to configure the load carrying latch bolt with a latch head which is rotatable relative to its bolt latch, about a rotation axis which is perpendicular to the direction of axial displacement of the latch head and bolt latch. In order to prevent the door from possibly opening from the outside, the rotational motion of the spring bolt can selectively be blocked and allowed by means of a blocking device operated with the emergency or panic exit fitting. Such selectively rotatable latch heads are sometimes referred to as collapsible latch bolts. When the door is pressed outwards and the fitting is activated, the blocking device of the latch head is released, so that the latch head can be rotated in the direction away from the striking plate, whereupon the friction between them decreases. The force which is required to release the spring bolt from engagement with the striking plate is thereby reduced.

[0010] WO 2009/096892 A1 and EP 2975202 A1 disclose examples of locks provided with such collapsible spring bolts.

[0011] However, there still remain problems at some types of locks for emergency doors. Frequently, locks for emergency doors comprise at least one latch bolt for defining the closed position of the door and at least one dead bolt for locking the door. Just as at the above described conventional locks, the latch bolt thus absorbs the sealing load and is normally operated by means of a handle, a door knob or the like for opening the door. Such handles or the like may be arranged on both sides of the door and may be connected to the latch bolt via one and the same follower. The dead bolt on the other hand is operated by a fitting, which requires some kind of authorisation means, such as a key, for being operated. Typically, the dead bolt is operated via a follower which is coupled to a key operated lock cylinder. However, the dead bolt follower may also be connected other actuation means, such as electrical motors, which require some kind of authorization for being operated. The latch bolt thus keeps there door closed whereas the dead bolt keeps the door locked.

[0012] Also at such emergency locks, it might happen that persons operate the handle when the lock is locked and the dead bolt is in the locked position, engaging the striking plate. This might for instance happen when a person on the inside and particularly on the outside, wants to find out if the door is locked or not.

[0013] When the handle is operated, the latch bolt will be retracted out of engagement with the striking plate. By this means, the sealing load will push the door slightly outwards, until the outer side surface of the dead bolt comes into contact with and bears against the striking plate. This small outward movement of the door may very well be sufficient for preventing the latch bolt from re-engaging the striking plate when the handle or the like is released. After such operation of the latch bolt, when the dead bolt is in its locked position, will thus result in that the dead bolt thereafter will bear against the striking plate and absorb the sealing load. Typically the dead bolt, especially if it is a high security swing bolt, such as a hook bolt, exhibits a considerably greater side surface area than the latch bolt. The resulting friction between the dead bolt and the striking plate caused by the sealing load is thus considerably higher that the corresponding friction between the latch bolt and the striking plate. This results in turn in that a considerably greater force needs to be applied to the emergency fitting for opening the door. Especially in panic situations, when crowding occurs on the inside and the outward load on the door increases, the friction between the dead bolt and the striking plate may increase to such an extent that it may be difficult or even impossible for persons to open the door by means of the emergency fitting. This naturally constitutes a sever problem.

Summary of the invention

[0014] Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the element, apparatus, component, means, step, etc." are to be interpreted openly as referring to at least one instance of the element, apparatus, component, means, step, etc., unless explicitly stated otherwise. The steps of any method disclosed herein do not have to be performed in the exact order disclosed, unless explicitly stated.

[0015] It is an object of the invention to provide and enhanced lock comprising at least one dead bolt and at least one latch bolt.

[0016] It is another object to provide such a lock which is safe in use.

[0017] Another object is to provide such a lock which allows for that the lock is fully operable by applying moderate manoeuvring forces and torques.

[0018] Another object is to provide such a look which promotes safe opening by means of emergency or panic evacuation fittings at various conditions.

[0019] Still another object is to provide such a lock which still provides high security.

[0020] One further object is to provide such a lock which is which is comparatively simple in construction.

[0021] Yet another object is to provide such a lock which is reliable in use and provides a long service life.

[0022] These and other objects are provided by a emergency or evacuation lock which of the kind defined by the preamble of appended claim 1, which lock exhibits the special technical features set out in the characterizing

portion of said claim.

[0023] The invention thus relates to a lock which comprises a dead bolt, a latch bolt and a first rotatable follower operably connected to a dead bolt for moving the deadbolt between an extended dead locking position and a retracted releasing position. A second rotatable follower is operably connected to a latch for retracting the latch from an extended latching position to a retraced releasing position. The lock further comprises a blocking device which is operably connected to the first follower and the second follower and arranged to prevent retraction of the latch by rotation of the second follower in a latch retracting direction when the dead bolt is in its extended dead locking position.

[0024] In use the first follower may be coupled to some kind of authorisation requiring fitting such as a lock cylinder for operation by means of a coded key. The second follower may be coupled to a handle or other non-authorisation requiring operating means, such as a door knob. Such operating means may be arranged on either or both sides of the door.

[0025] The first follower and the associated dead bolt are thus used for locking and unlocking the door. The second follower and the associated latch bolt are used for keeping the door closed and for opening the door, when it is unlocked.

[0026] The blocking device prevents the second follower from rotating in its opening direction when the dead bolt is in the extended locking position, engaging a striking plate. Hereby, the handles or other operating fittings connected to the second follower may not be used for retracting the latch bolt when the dead bolt engages the striking plate. It is thus assured that it is always the latch bolt which constitutes the load carrying bolt that is pressed by the sealing pressure and any additional outward directed load applied on the door. It is thus possible to control the friction against the striking plate which needs to be overcome for opening the door, merely by designing the latch bolt in an appropriate manner. The design of the dead bolt, on the other hand, may entirely be directed to high security of the lock, i.e. for preventing unauthorized opening of the door when it is locked. When designing the dead bolt, no consideration needs to be made in regard of the torque needed to be applied for unlocking the lock.

[0027] By this means the inventive blocking device makes it possible to provide a lock which is both safe and reliable in use and secure in that it effectively prevents unauthorized opening of the door from the outside.

[0028] The first follower may be operably connected to the blocking device for driving the blocking device between a blocking position, at which the blocking device blocks rotation of the second follower in a latch retracting direction and a non-blocking position, at which the second follower is allowed to rotate in the latch retracting direction.

[0029] The first follower and the blocking device may be provided with first cooperating driving means arranged to drive the blocking device to the blocking position upon rotation of the first follower in a dead bolt extending direction.

[0030] The first follower and the blocking device may be provided with second cooperating driving means arranged to drive the blocking device to the non-blocking position upon rotation of the first follower in a dead bolt retracting direction.

[0031] The blocking device and the second follower may be provided with cooperating blocking surfaces arranged to, in mutual contact, block rotation of the second follower in a latch retracting position.

[0032] The latch and the second follower may be arranged to allow retraction of the latch irrespective of the rotational position or movement of the second follower. By this means the latch bolt may be pushed into the retracted position also when the second follower is blocked by the blocking device. The latch may thus be pushed in e.g. when its bevelled surface contacts the striking plate upon closing the door. This may be particularly advantageous when using the lock together with an electric pivotal striking plate which allows the dead bolt to be brought in and out of engagement also in the extended position of the dead bolt. Due to the ability of the latch bolt to be pushed into the retracted positions the door may at such electric striking plates be so called slam shut.

[0033] The blocking device may comprise a linearly displaceable member.

[0034] The linearly displaceable member may comprise at least one blocking surface arranged to cooperate with a corresponding blocking surface on the second follower.

[0035] The linearly displaceable member may be formed generally as a plate member with a protruding tab forming at least one blocking surface.

[0036] The second follower comprises a radially extending first arm The first arm may provided with a blocking surface.

[0037] The first arm may further be provided with a latch driving surface arranged to, when in contact with the latch, drive the latch towards the retracted position when the second follower is rotated in the latch retracting direction.

[0038] The first follower may comprise a radially extending arm which is provided with a first driving surface for driving the blocking device to the blocking position and/or a second driving surface for driving the blocking device to the non-blocking surface.

[0039] The dead bolt may be a swing bolt. It may for instance be formed as a pivotal hook bolt. This allows for providing a lock which exhibits high security.

[0040] The lock may further comprise a third rotatable follower operably connected to the dead bolt and the latch bolt, for retracting the dead bolt and the latch bolt to their respective retracted releasing positions. In such cases the lock may form an emergency lock at which the third follower is intended to be coupled to a emergency or panic exit fitting for simultaneous retraction of the dead bolt

and the latch bolt, such that quick and safe opening of the door may be accomplished. In such cases the inventive blocking device prevents the sealing load or any additional load applied to the inside of the door, e.g. by a crowed at a panic situation to be transferred to and absorbed by the dead bolt. Thereby the risk that friction between the dead bolt and the striking plate would obstruct easy and safe opening of the emergency door is greatly reduced or eliminated.

Brief description of the drawings

[0041] The invention is now described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of an emergency or evacuation lock according to an embodiment of the invention where a cover plate of the case has been removed.

Fig. 2 is an exploded perspective view of the lock shown in fig. 1.

Fig. 3 is a perspective view with some components removed illustrating the lock shown in figs. 1 and 2 when the blocking device is in a non-blocking position.

Fig. 4 is a perspective view in accordance with fig. 3 showing the blocking device in its blocking position.

Detailed description of embodiments

[0042] The invention will now be described more fully hereinafter with reference to the accompanying drawings, in which certain embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided by way of example so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout the description.

[0043] In the exemplifying embodiment shown in the figures, the inventive blocking device is applied to a emergency lock provided with a third follower intended to be connected to a emergency handle or panic exit bar. In other embodiments however which are not illustrated in the drawings, a corresponding blocking device may be applied to a lock comprising only two followers for operating at least one dead bolt and at least one latch bolt respectively.

[0044] The emergency lock shown in figs. 1 and 2 is a mortice lock intended to be mounted in a recess arranged in an emergency or evacuation door and to cooperate with a striking plate (not shown) arranged in the door frame. The lock comprises a lock case 1 with a case bottom 2 and a cover plate 3. A forend 4 is fixed to a front edge of the case 1. The forend 4 exhibits a dead bolt opening 4a for allowing a dead bolt 5 to be extended out to a locking position (fig. 1) and retracted into a releasing position. In the shown example the dead bolt 5 is a pivotal hook bolt. The dead bolt may however also be constituted by a linearly displaceable rectangular or cylindrical bolt, by another type of swing bolt or by any other type of bolt which provides a locking function to the door. The forend 4 is also provided with a latch bolt opening 4b, for allowing a latch bolt 6 to be extended out to a latching position (fig. 1) and retracted into a releasing position.

[0045] The latch bolt 6 comprises a latch head 6a with a bevelled surface and a bolt latch 6b with a rear drive flange 6c.

[0046] The dead bolt 5 is pivotally arranged about a pivotal axis defined by a stud 5a, which is fixed to the case bottom 2 and lid 3. The dead bolt is also provided with bolt driving means 5b in the form of teeth arranged at its rear portion.

[0047] The lock further comprises a first follower 10, a second follower 20 and a third follower 30. All followers 10, 20, 30 are rotatable and arranged to be connected to a respective manoeuvring or actuation fitting for operating the dead bolt and/or the latch bolt.

[0048] The first follower 10 is operably connected to the dead bolt 5 for moving the deadbolt between the extended locking position and the retracted releasing position. For this reason, the first follower 10 comprises a radially extending first follower arm 11 which is provided with dead bolt drive means 12 in the form of teeth 12 cooperating with the drive means 5b of the dead bolt. The first follower 10 and the first arm 11 may be integrally formed as a single component. Alternatively, the first follower may be formed as a follower assembly comprising multiple components which are operably connected for transferring actuation movements from an actuation means to the dead bolt.

[0049] By rotating the first follower 10 in the counter clockwise direction (as see in figs. 1 and 2) the cooperating drive means 12, 5b, will cause the dead bolt 5 to rotate or pivot in the clockwise direction, toward its extended locking position. Correspondingly, clockwise rotation of the first follower 10 will cause the dead bolt to rotate or pivot toward its retracted releasing position.

[0050] In use, the first follower 10 is typically coupled to some kind of actuation fitting which requires an authorization for being operated. Such an authorization requiring fitting should normally be arranged at least on one side of the door whereas the other side of the door could be provided with an actuation fitting which does or does not require authorization. A typical example would be to connect the first follower to a key operated lock cylinder arranged on the outside and a thumb turn arranged on the inside of the door. The first follower may however be coupled also to many other types of actuating means such as electric motors, linear actuators or the

like, which may be arranged on either or both sides of the door.

[0051] The second rotatable follower 20 comprises, in the shown example, a hub 21 exhibiting a square bore for receiving a plain spindle (not shown) of a handle or the like. A latch bolt drive member 22 is coaxially fixed to the hub 21 and rotatable together with the hub 21. The drive member 22 exhibits a radially extending second follower arm 23 with a latch bolt driving surface 25, which is arranged to drive the latch bolt 6 toward the retracted position by contacting the drive flange 6c of the latch bolt 6. A first spring 26 is arranged to return the second follower 20 to its non-activated rest position. A second spring 6d is arranged to bias the latch bolt 6 to its extended latching position. In this example the second follower 20 is thus formed as a second follower assembly comprising multiple components. It is however also possible to form the second follower as an integral component or as alternative assemblies, as long as it is capable of transferring an actuation movement from an actuation means to the latch bolt for displacing the latch bolt to its retracted releasing position.

[0052] In use the second follower is typically connected to a handle arranged at the inside of the door and a further handle arranged at the outside of the door. The second follower may however be coupled also to many other types of actuating means such as electric motors, linear actuators or the like which may be arranged on either or both sides of the door. These actuating means may or may not require authorisation for being operated.

[0053] The third rotatable follower 30 is arranged for being operatively connected to an emergency or panic exit fitting (not shown). Such fittings may for example comprise easy manoeuvrable emergency handles or panic bars which extend horizontally over a substantial portion of the width of the door. Typically the emergency fitting is comparatively large, easy to access and actuate and it may be provided with gear means such that a moderate force applied to the fitting results in considerable torque acting on the third follower for exceeding friction and other resistances when retracting the dead bolt and the latch bolt.

[0054] The main function of the third follower 30 is thus to accomplish retraction of both the dead bolt and the latch bolt by simple actuation of a single readily accessible actuation fitting. The purpose being to allow safe and quick exit through the door in case of e.g. fire or other hazardous situations.

[0055] The third follower 30 is thus operatively connected to both the dead bolt 5 and the latch bolt 6 for retraction of these bolts. In the shown example, this connection is accomplished by means of a first rotatable drive disc 31 which is coaxially fixed to the third follower 30 and rotatable together therewith.

[0056] The first rotatable drive disc 31 exhibits a radially extending drive cam 31a and radial drive teeth 31b. Upon rotation of the third follower 30 and the first drive disc 31, the drive cam 31a contacts and drives a second rotatable drive disc 32 provided with teeth 32a which in in turn engages corresponding teeth (not shown) on the first follower. Rotation of the first disc 31 also causes its teeth 31b to engage corresponding teeth 33a on a third drive disc 33 to thereby rotate also the third disc 33. The third disc 33 exhibits a drive arm 33b which, upon counter clockwise rotation (as seen in fig 2), contacts the drive flange 6c of the latch bolt 6 for pushing the latch bolt to the retracted position. The operative connection between the third follower and the dead and latch bolts may however also be accomplished in many other ways as readily perceived by the skilled person.

[0057] The connection between the third follower and the dead and latch bolts is preferably arranged such that retraction of the dead bolt is initiated before the retraction of the latch bolt. Normally the dead bolt extends further out from the forend than the latch bolt. Hence, in order to achieve that the dead bolt is fully retracted before the latch bolt leaves its load bearing engagement with the striker plate, the retraction of the dead bolt needs to be initiated earlier and/or be executed at a higher speed than the latch bolt. This however limits the available rotational stroke of the third follower which is available for effecting the retraction of the dead bolt and the latch bolt. This in turn limits the gear ratio which may be used for effecting an as high retracting torque and force as possible on the dead and latch bolts for retracting these. This makes it even more difficult to achieve retraction of a dead bolt which is in frictional engagement with the striking plate by applying a moderate force to the emergency fitting. It should further be noted that the retraction of the latch bolt 6 by means of the third follower 30 should not involve movement of the second follower 20. The connection between the third follower 30 and the latch bolt 6, should thus be arranged such that the latch bolt may be retracted by rotating the third follower irrespective of the position and movement of the second follower

[0058] The lock further comprises a blocking device 40. In the shown example the blocking device 40 comprises a linearly displaceable plate member 41 provided with elongated through holes 42. The through holes 42 are engaged by fixed guide studs 43 for rectilinear guiding back and forth perpendicular to the movement direction of the latch bolt 6. By this means the blocking device 40 is linearly displaceable between a non-blocking position (shown in fig. 3) and a blocking position (shown in fig. 4).

[0059] The plate member 41 is further provided with drive means 44a, 44b for allowing the blocking device to be driven by the first follower 10. In the shown example the plate member exhibits a cut out 44 defining a first drive surface 44a for driving the blocking member to the blocking position. The plate member 41 is also provided with a downwardly bent tab 47 arranged in proximity to the forend 4. The tab 47 exhibits a second drive surface 47a, which faces toward the second follower 20 and which is arranged for driving the blocking device to the non-blocking position. For effecting such driving of the blocking device 40, the first follower 10 is provided with

corresponding drive means 13, 14. In the shown example the first follower's drive means comprises a stud 13 which extends from the first follower arm in a direction parallel to the pivotal axis of the dead bolt 5. The mantle surface of the stud 13 exhibit a first blocking device driving surface 13a arranged to contact drive surface 44a. The first follower's 10 drive means also comprises an edge surface 14 arranged at the free end of the follower arm 11. The edge surface 14 forms a second blocking device driving surface 14 arranged to contact the second drive surface 47a.

[0060] As seen in the figures, rotating the first follower 10 clockwise, for moving the dead bolt 5 to its extended locking position, causes the first follower arm 11 and the stud 13 to move towards the second follower 20. The stud 13 thereby makes contact with the first drive surface 44a on the blocking device 40 to thereby drive the blocking device toward the second follower 20 for reaching the blocking position. Correspondingly, rotating the first follower 10 counter-clockwise, for moving the dead bolt 5 to its retracted releasing position, causes the first follower arm 11 and the free end of the follower arm 11 to move away from the second follower 20. The second blocking device driving surface 14 thereby makes contact with the second drive surface 47a on the blocking device 40 to thereby drive the blocking device away from the second follower 20 for reaching the non-blocking position

[0061] The blocking device also comprises a first blocking surface 45. In the shown example the first blocking surface 45 is formed by an edge surface of a tab 46 extending from the plate member 41, generally perpendicular to the plane of the plate member 41. As best seen in fig 2, the second follower arm 23 is provided with a corresponding second blocking surface 24 which is formed as a rearward facing edge surface, arranged in proximity to the free end of the second follower arm 23.

[0062] Fig. 3 shows the first follower 10, the second follower 20 and the blocking device 40 in the non-blocking position. At this position the second blocking device drive surface 14 has, by contacting the second drive surface 47a, driven the blocking device away from the second follower 20. Thereby the first blocking surface 45 has been retracted away from the second follower arm 23, such that the free end of this arm 23 and the second blocking surface goes free from the first blocking surface. In this non-blocking position, where the dead bolt 5 is retracted, it is possible to rotate the second follower clockwise (as seen in the figure) to thereby rotate the second follower arm 23 to contact and push latch driving flange 6c rearward and to thereby retract the latch bolt 6 in in a conventional manner.

[0063] Fig. 4 shows the blocking position, where the first follower 10 has been rotated counter-clockwise to drive the dead bolt 5 to its extended locking position. During this counter-clockwise rotation, the stud 13 has contacted the first drive surface 44a and driven the blocking device 40 to the blocking position. Hereby the tab 46 and the first blocking surface 45 have been disposed to the circular curve segment which is defined by the rotational movement of the free end of the second follower arm 23 and the second blocking surface 24. The first blocking surface 45 is thus positioned such that it is contacted by the second blocking surface 24 on the second follower if the second follower 20 is rotated for retracting the latch bolt out of engagement with the striking plate.

[0064] In this way the second follower 20 has been blocked and may not be rotated clock-wise (as seen in the figures) for retracting the latch bolt 6. This in turn assures that the latch bolt 6 is always in engagement with the striking plate as long as the dead bolt 5 is not in its retracted releasing position. Hereby it is further guaranteed that the latch bolt will always absorb the outwardly directed load exerted by the sealing and any additional force on the door and that the risk of the dead bolt being frictionally prevent from retraction is eliminated.

[0065] As realized from the figures and the description above, the latch bolt 6, may be pushed into the releasing position, against the biasing force of the spring 6d, also when the blocking device is in the blocking position and the second follower prevented from rotating clockwise. As mentioned above this may be used for allowing so called slam shutting of the door when the lock is used in cooperation with an electric striking plate allowing the dead bolt to be brought in and out of engagement with the striking plate by means of a pivotal dead bolt engagement device.

[0066] Above the invention has been described by means of exemplifying embodiments. The invention is however not limited to these embodiments, but may be varied freely within the scope of the appended claims. For example, the dead bolt may be any kind of bolt providing a locking function, such as for example a linearly displaceable bolt having any cross sectional shape, a swing bolt without a hook or a hook bolt or mushroom bolt which is linearly displaceable in parallel with the forend. Additionally, the lock may be provided with more than one latch bolt and/or more than one dead bolt. The lock may also form part of a multi point lock comprising e.g. an espagnolette with one or several remote or satellite bolts. Further and as mentioned above the lock may be a non-emergency lock without a third follower for connection to a emergency fitting.

Claims

1. Lock comprising;

- a dead bolt (5) and a latch bolt (6),
- a first rotatable follower (10) operably connected to the dead bolt (5) for moving the deadbolt between an extended dead locking position and a retracted releasing position, and
- a second rotatable follower (20) operably connected to the latch bolt (6) for retracting the latch bolt (6) from an extended latching position to a

retraced releasing position,

characterized by
a blocking device (40) which is operably connected to the first follower (10) and the second follower (20) and arranged to prevent retraction of the latch bolt (6) by rotation of the second follower (20) in a latch retracting direction when the dead bolt (5) is in its extended dead locking position.

2. Lock according to claim 1, wherein the first follower (10) is operably connected to the blocking device (40) for driving the blocking device between a blocking position, at which the blocking device blocks rotation of the second follower (20) in a latch retracting direction and a non-blocking position, at which the second follower (20) is allowed to rotate in the latch retracting direction.

3. Lock according to claim 1 or 2, wherein the first follower (10) and the blocking device (40) are provided with first cooperating driving means (13, 44a) arranged to drive the blocking device (40) to the blocking position upon rotation of the first follower (10) in a dead bolt extending direction.

4. Lock according to claim 3, wherein the first follower (10) and the blocking device (40) are provided with second cooperating driving means (14, 47a) arranged to drive the blocking device (40) to the non-blocking position upon rotation of the first follower (10) in a dead bolt retracting direction.

5. Lock according any of claims 1-4, wherein the blocking device (40) and the second follower (20) are provided with cooperating blocking surfaces (45, 24) arranged to, in mutual contact, block rotation of the second follower (20) in a latch retracting position.

6. Lock according to any of claims 1-5, wherein the latch bolt (6) and the second follower (20) are arranged to allow retraction of the latch bolt (6) irrespective of the rotational position or movement of the second follower (20).

7. Lock according to any of clams 1-6, wherein the blocking device (40) comprises a linearly displaceable member (41).

8. Lock according to claim 7, wherein the linearly displaceable member (41) comprises at least one blocking surface (45) arranged to cooperate with a corresponding blocking surface (24) on the second follower (20).

9. Lock according to 8, wherein the linearly displaceable member (41) is formed generally as a plate member with a protruding tab (46) forming at least one blocking surface (45).

10. Lock according to any of claims 1-9, wherein the second follower (20) comprises a radially extending second follower arm (23).

11. Lock according to claim 10, wherein the second follower arm (23) is provided with a blocking surface (24).

12. Lock according to claim 10 or 11, wherein the second follower arm (23) is provided with a latch driving surface (25) arranged to, in contact with the latch bolt (6), drive the latch bolt towards the retracted position when the second follower (20) is rotated in the latch retracting direction.

13. Lock according to any of claims 1-12, wherein the first follower (10) comprises a radially extending arm (11) which is provided with a first driving surface (13a) for driving the blocking device (40) to the blocking position and/or a second driving surface (47a) for driving the blocking device (40) to the non-blocking surface.

14. Emergency or evacuation lock according to any of claims 1-13, wherein the dead bolt (5) is a swing bolt.

15. Lock according to any of claims 1-14, wherein the lock further comprises a third rotatable follower (30) operably connected to the dead bolt (5) and the latch bolt (6), for retracting the dead bolt and the latch bolt to their respective retracted releasing positions.

16. Lock according to claim 15, wherein the lock is an emergency exit lock.

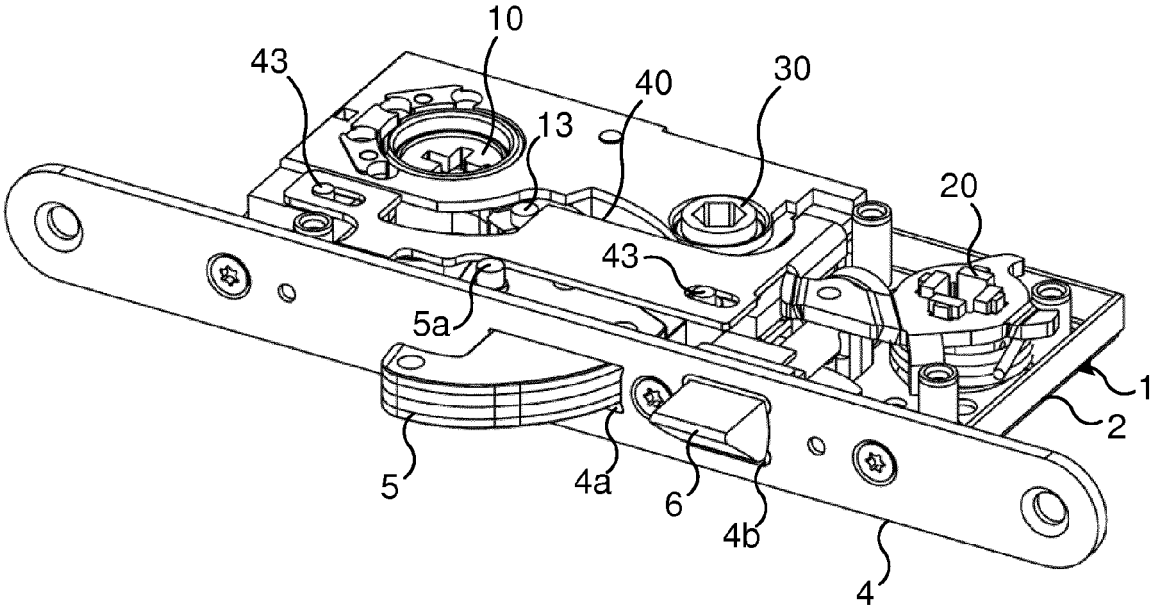
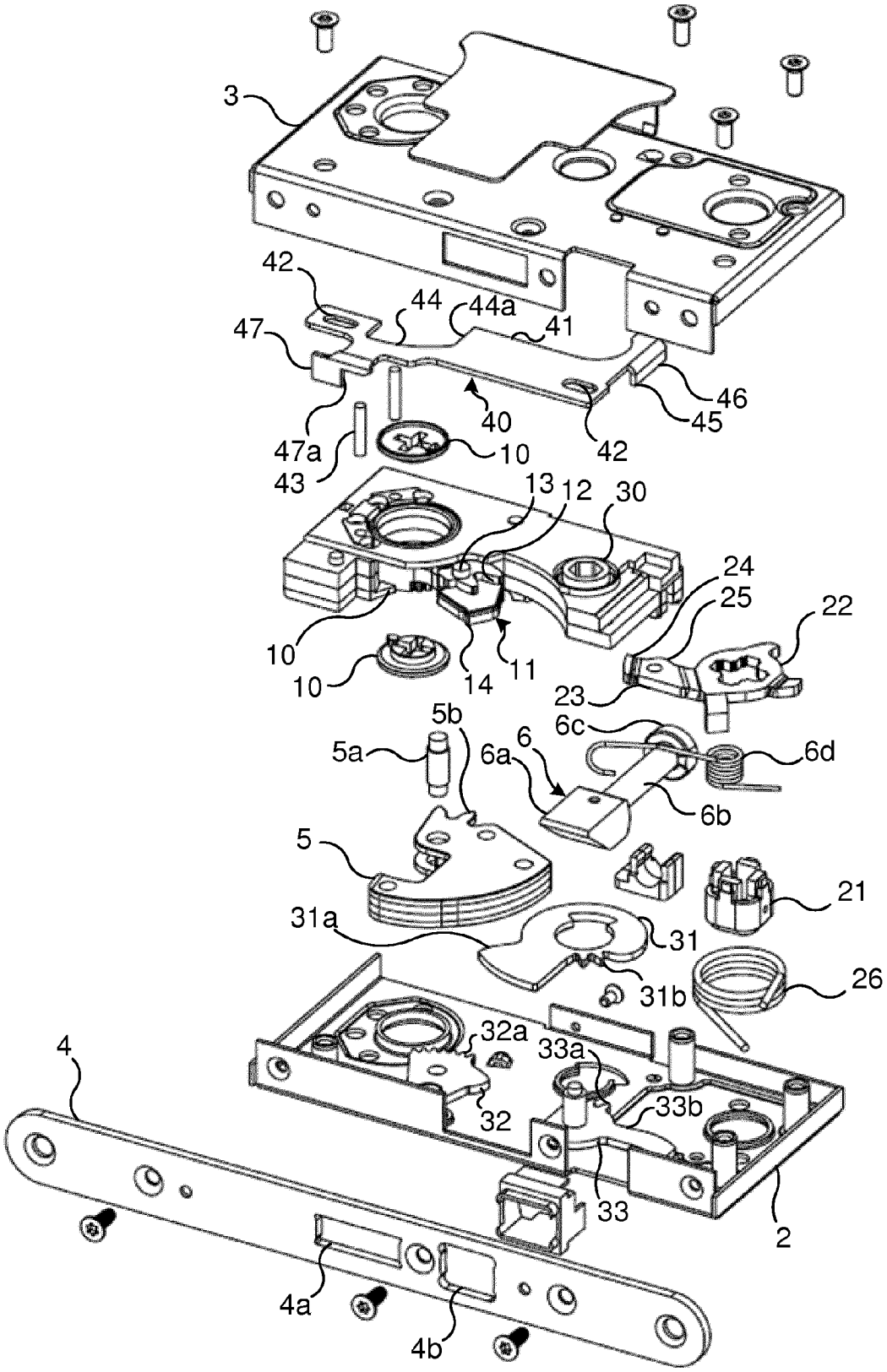


Fig. 1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44a
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47a
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10
10
14
11
23
5b
6c
5a
6
6a
6d
6b
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31a
31
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31b
4
32a
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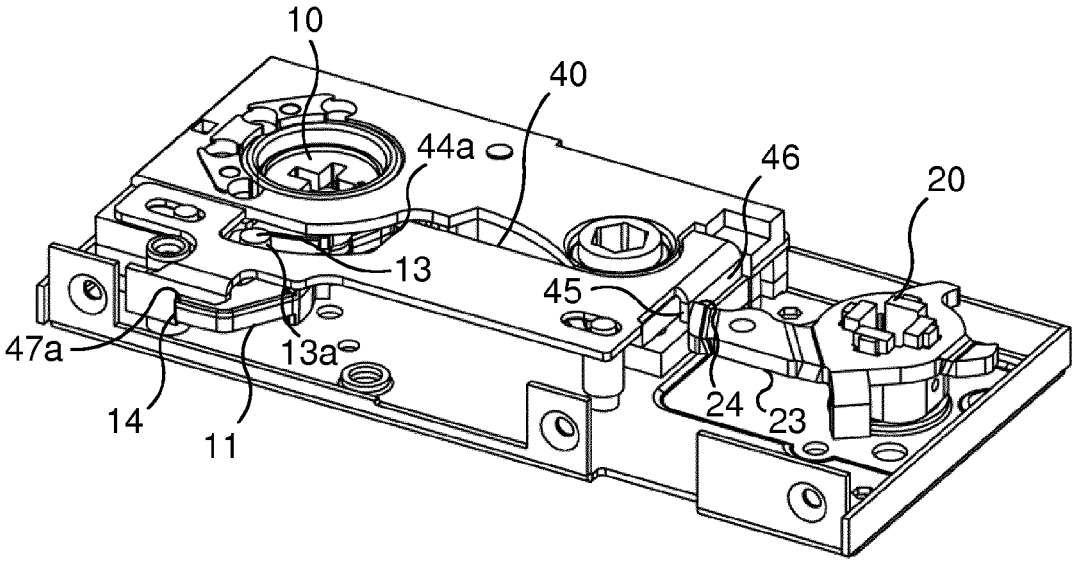
33
2
4a
4b

Fig. 2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40
44a
46
20
13
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47a
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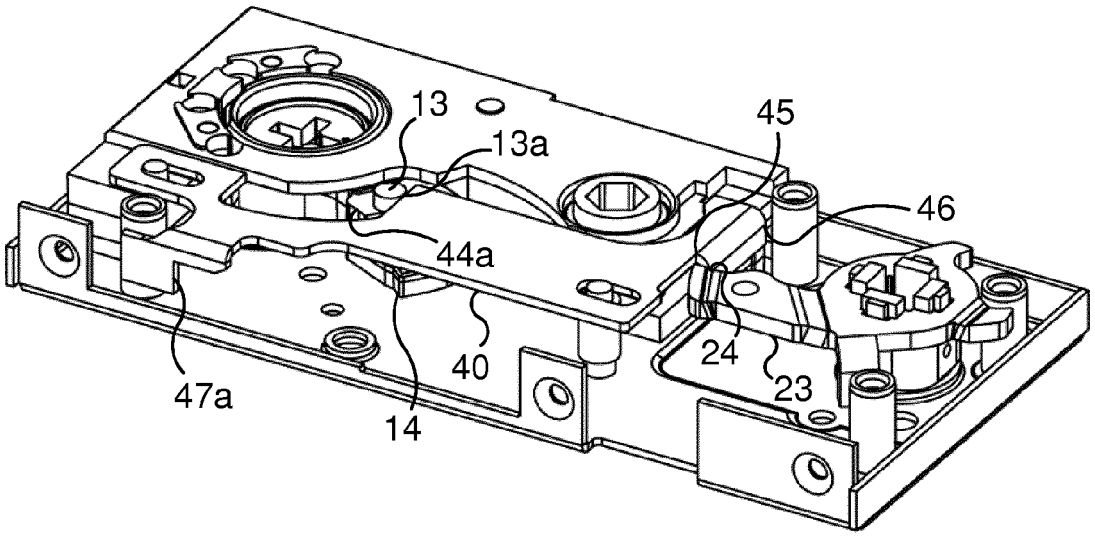
Fig. 3


13
45
13a
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44a
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47a
14

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 16 17 2889

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E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 November 2016	Koster, Michael

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