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Title: Lock with a catch bolt protruding out
from the lock casing

Description

The invention relates to a lock according to the generic part of patent claim 1, wherein a catch bolt protrudes out from the lock casing, which catch bolt's tail, displaceably guided inside the lock casing, is retractable through the contact of an arm of a spring-cushioned lever handle follower and can be moved forward into locking action and backward through locking actuation by means of a key, a closing cylinder, a second follower or the like, after preceding release of a dead locking device.

Such lock, serving as lock for glass doors, is known on the market. The tail of a catch bolt is journaled about a tenon of a dead locking device, by which it is backwards overlapped, and which intersects a closing contact aperture of the catch bolt tail and which stretches out with an angled end into the moving area of the follower. Furthermore, the dead locking device is equipped with a blocking projection, which depending on the catch bolt's position is positioned in front of or behind a stopping shoulder of the lock casing. In this embodiment, the displacement of the catch bolt by means of the lever handle follower is always realised through the dead locking device.



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The object of the invention is to solve the problem of designing a lock of this species with advantageous locking technique while realising a simple construction.

This problem is solved by the features according to patent claim 1, whereby a dead locking device, liftable by a closing bit, is realised as one-armed lever, that itself presents a turn aperture into which engages a catch bolt tail-sided turn pin and which is supported about a casing-sided stay tenon arranged above the catch bolt head.

The consequence of this species' conception is a usually upright lock excelling besides simple construction in advantageous locking technique design. The dead locking device is no longer supported at the catch bolt tail, but around a casing-sided stay tenon arranged above the catch bolt head. The opening forces acting upon the catch bolt head, in case the catch bolt is moved forward into the locking position, are now directly guided via the turn pin into the dead locking device and thus into the casing-sided stay tenon, such that high reversed rotation forces can be absorbed without damage. Moving the catch bolt forward into locking action and backward requires the preceding release of the dead locking device and the clearing of the turn pin, such that

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the catch bolt is lockable by means of the closing bit acting upon the catch bolt tail. It is provided for that the turn aperture is located at the free end of the dead locking lever and the contact point for the closing bit is almost located in its center. This results in advantageous leverage actions together with smooth locking operation. Another advantageous feature is the fact that a dead locking lever is spring-cushioned with regard to a lateral casing wall. The dead locking lever thus, according to its definition, takes its predetermined end position. On the one hand, it allows the catch bolt's retracting, when pulling close a door equipped with the lock; on the other hand, in case the catch bolt is moved forward into locking action, the dead locking lever blocks the backward displacement.

Another advantageous feature is provided by the fact that the catch bolt tail presents a solidly thereto bonded cam projection upon which acts an arm of the lever handle follower and which is displaced out of the swivelling range in case the catch bolt is moved forward into the locking position. Contrary to prior art, the closing bit as well as the lever handle follower act upon the catch bolt tail. The dead locking device is freed from charge

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exerted by the lever handle follower. In case the catch bolt has not been moved forward into the locking position, the cam projection stretches out into the area of the arm of the lever handle follower. Once the catch bolt has been moved forward into the locking position, the lever handle follower idles. The cam projection just drags the arm of the lever handle follower against the catch bolt being meanwhile pushed by the spring resistance, such that the follower according to its definition always returns into the initial position.

Furthermore, from the perspective of locking technique, it is favourable the cam projection presents a bevelled designed sliding surface formed for the contact of the nose of the arm. For this reason, identical leverage conditions prevail when retracting the catch bolt by means of the lever handle follower. Another advantageous feature is realised in that a spring holds the arm of the lever handle follower in place and in an orientation parallel to the bolt displacement direction. Therefore, the lever handle follower can, directly during swivelling, get into effective connection with the cam projection.

To solve the problem of the invention for a lock with a catch bolt protruding out from the

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lock casing, which catch bolt's tail, displaceably guided in the lock casing, is retractable by means of the contact of an arm of a spring-cushioned lever handle follower, it is furthermore provided the spring resistance of the spring, which cushions the lever handle follower, is adjustable. Due to this fact, it is possible to allocate either a lever handle or a turning knob to the follower. In case the lever handle follower is equipped with a lever handle, the existing leverage is more important, in that case, it is desired to have a higher spring resistance. In case however a turning knob is used, the spring resistance can be lowered, guaranteeing nevertheless an easy closing rotation of the turning knob. For this purpose, a spring contact point, fixed to the casing, is displaceable, for convenience this can be done from the lock casing's outside. It is furthermore provided that the spring acting upon the follower arm is a tension spring. In this case, the spring contact point is realised by a pin that can be displaced inside the lock casing. With the intention to change the spring resistance, the pin is displaceable between two positions in a longitudinal slot. In detail this means, due to its bayonet-type fastening, the pin is hold in one of its two final positions. For this purpose, at the end

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sides, the pin is provided with flattenings respectively on opposite sides, which in the one position, in the slot sections of the slots arranged in the lock cover and in the lock bottom are parallel to the slot walls, and in the other position, in a section enlarged slot section they are arranged transversely with regard to the slot walls. Changing the spring resistance simply requires turning the pin such that the flattenings come into a truly aligned position with regard to the slot walls. Therefore, upon a previous 90° rotation, the pin can be displaced. On the front it is therefore provided with an opening for a tool contact, which can be designed for example in form of a groove, allowing a screwdriver point for example to engage. A self-displacement of the pin is prevented by the fact that the enlarged slot section builds support surfaces for the plane location of the flattening borders. In this version too, it is provided that the catch bolt tail can be additionally moved forward into locking action and backward by the actuation of a closing bit, after a previous displacement of a dead locking device. Technical guidance advantages result from the fact that the catch bolt tail is guided close between both lateral lock walls and is cushioned by a tension spring in locking

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direction. Finally one favourable feature of the invention resides also in the fact that the lever handle follower is provided with a fork sparing defining a clearance and thus embraces a lock casing-sided stop tenon.

Hereinafter the invention is explained in several embodiment examples on the basis of diagrammatic drawings. It shows:

Figure 1: a view of a lock according to a first embodiment, wherein the catch bolt is displaceable by means of a lever handle as well as by a profile closing cylinder.

Figure 2: an illustration like in figure 1, however with removed lock cover, representing the position in which the catch bolt can be moved backward by the lever handle follower.

Figure 3: a subsequent illustration of figure 2, wherein the catch bolt is retracted by the lever handle follower.

Figure 4: an illustration comparable to figure 2, but with the catch bolt moved forward into the locking position.

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- Figure 5: an illustration comparable to figure 2, wherein the spring resistance acting upon the lever handle follower is set to a lower value.
- Figure 6: an enlarged illustration of a section according to line VI - VI in figure 1.
- Figure 7: a separate illustration of a catch bolt.
- Figure 8: a top view on figure 7, partially opened.
- Figure 9: a view of the dead locking device.
- Figure 10: a top view on the dead locking device.
- Figure 11: a view of the lock according to a second embodiment example with removed lock cover, whereby the catch bolt is displaceable by means of the closing bit of a second follower, the catch bolt being in normal position.
- Figure 12: an illustration comparable to figure 11, in this case respectively with a catch bolt retracted by the lever handle follower.

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Figure 13: a view of the catch bolt in the locking position.

Figure 14: an illustration corresponding to figure 11, with the difference thereto that the tension spring acts with lower spring resistance upon the lever handle follower.

A lock 1 according to a first embodiment comprises a lock casing 2 having a longish design such that the length of the lock casing 2 approximately corresponds to the double width of the lock casing. Two longitudinal lateral walls 4, 5 are erected upright on a lock bottom 3, which in a backward area of the lock casing 2 are linked to each other by a spherical formed back wall 6. A front wall 7 of the lock casing 2, however is right-angled with regard to the longitudinal lateral walls 4, 5.

Inside the lock casing 2, a catch bolt tail 8 of catch bolt 9 is guided between both lateral lock walls 4, 5, which catch bolt's head 10 is equipped with a latch ramp 10' that penetrates an aperture 11 in the front wall 7. The catch bolt tail 8 is fork-type executed. One end of a tension spring 13 acts upon a tenon 12 stretching out from a shorter fork leg 8'. The other spring end embraces a stay tenon 14

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of the lock bottom 3, thereby the catch bolt 9 is spring loaded in forward moving direction.

Another fork leg 8'' almost corresponds to the triple length of the fork leg 8'. On the inside, the fork leg 8" forms a closing contact aperture 15. Subsequently is arranged a turn pin 16 with rectangular section. Above which, the fork leg 8" is provided in the end area with a longitudinal slot 17, which extends in the displacement direction of the catch bolt and into which engages a lock bottom-sided guiding tenon 18. At its free end, the fork leg 8" of the catch bolt tail 8 builds a cam projection 19 for the contact of an arm 20 of a lever handle follower 21, which is suspended in the rear part of the lock casing 2 between the lock bottom 3 and a lock cover 22 arranged parallel thereto. The cam projection 19 has got a bevelled sliding surface 23 for the contact of a nose 20' of the arm 20, whereby the nose 20' in the normal position of the catch bolt 9 is positioned close below the cam projection 19, such that the forward moving displacement of the catch bolt 9 is not impeded.

The normal position of the catch bolt 9, compare with figure 2, is maintained by a dead locking lever 24. The dead locking lever 24 is designed as one-armed lever, which forms

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two turn apertures 25, 26 one positioned behind the other, at its narrow side oriented towards the turn pin 16. A center web 27 divides this narrow side. In the catch bolt's 9 normal position, the center web 27 extends in front of the turn pin 16 and thus blocks the forward moving displacement of the catch bolt 9. Following the turn aperture 26, the dead locking lever 24 builds an arcuate thickening 28, which stretches into the closing contact aperture 15. The thickening 28 represents the closing bit contact point and extends approximately in the center of the one-armed dead locking lever 24. The other end of the dead locking lever 24 is suspended about a casing-sided stay tenon 29 above the catch bolt head 10. The respective turn apertures 25, 26 however are located at the free end of the dead locking lever 24, said free end builds an angle 30. By means of said angle, the dead locking lever 24 is supported on a lock bottom-sided projection 31, whereby the dead locking lever 24 is maintained in a defined normal position. A pressure spring 32 acts upon the dead locking lever 24, loading it in the normal position, as represented according to figure 2. This pressure spring 32, itself, finds a support at the lateral casing wall 4.

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On the opposite side of its arm 20, the lever handle follower 21 is provided with a fork spring 33 defining a clearance, into which spring reaches a lock casing-sided stop tenon 34. In the normal position of lock 1, the lever handle follower 21 takes the position as illustrated in figure 2, and is trapped in this position by means of the spring 35 acting upon the arm 20. Its one end embraces a tenon projection 36 of the arm 20. However the spring contact point P, fixed to the casing, is adjustable for modification of the spring resistance. For this purpose, the spring contact point P is displaceable. With regard to the spring 35, it is a tension spring. A pin 37, displaceable inside the casing 2, builds the spring contact point P fixed to the casing. This pin is displaceable between two positions in a longitudinal slot 38 of the lock bottom 3 and the lock cover 22. The longitudinal slot's 38 orientation follows the direction of the arm 20 of the lever handle follower 21. The longitudinal slot 38 is designed such that the pin 37 is maintained in one of its two end positions by means of a bayonet-type fastening. On its end sides, the pin 37 has got respectively opposite flattenings 39. The distance between them is slightly shorter than the distance between the slot walls 40 parallel to each other of the

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slot sections 41 of the lock bottom 3 and of the lock cover 22. In this case, the slot section 41 is positioned at a shorter distance to the arm 20 than the slot section 42, which is enlarged with regard to the slot section 41, and which inside wall is adapted to the exterior wall shape of the pin 37. In case the pin 37 enters the slot section 42 and the flattenings 39, provided on the end sides of the pin 37, are transverse with regard to the slot walls 40, the spring resistance of the spring 35 is higher, compare with the pin's 37 pulled position illustrated in figure 6.

In order to prevent the pin 37 from self-displacement, the enlarged slot section 42 in the lock bottom 3 and in the lock cover 22 builds support surfaces 43 such to planely locate the border areas of the flattenings 39. These support surfaces 43 are transversely oriented with regard to the slot walls 40.

After preceding 90° rotation, the pin 37 can be transferred into the dash-and-dot position according to figure 6 and into the position represented by solid lines according to figure 5, such that the spring 35 acts with lower resistance on the lever handle follower 21. This case is chosen when a not-shown turning knob is assigned to the lever handle follower 21. In case however, the lever handle

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follower 21 is equipped with a door lever handle 44, as illustrated by a dash-and-dot line in figure 1, the pin 37 takes the position, where it is placed in the enlarged slot section 42. For the purpose of transferring the pin 37 from outside, the fronts of the pin 37 are provided with a tool contact opening 37' for the application of a screwdriver.

Moving the catch bolt 9 forward into locking action respectively backward is possible by means of a profile closing cylinder 45 penetrating the lock cover 22 and the lock bottom 3. Its closing bit 46 interacts with the dead locking lever 24 as well as with the closing contact aperture 15 of the catch bolt tail 8.

The following operation is obtained:

In case a not-shown door equipped with the lock 1 is pulled in its closed position, the catch bolt 9, because of its latch ramp 10', withdraws in lock-inward direction, whereby the turn pin 16 moves within the turn aperture 25. When the door is in the closed position, due to the load of the tension spring 13, the catch bolt 9 can then move forward into the normal position, according to figure 2. This position allows to retract the catch bolt 9 by the actuation of the lever handle, compare

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with figure 3. In that case, a nose 20' of the arm 20 of the lever handle follower 21 strikes the sliding surface 23 of the catch bolt tail 8 and thus moves the catch bolt 9 lock-inwards. The rotation displacement of the lever handle follower 21 is limited by the fact that a fork leg 33' strikes the stop tenon 34 of the lock casing 2. By this action, the spring 35 is extended. This relates likewise to the tension spring 13 acting upon the catch bolt 9. When the door lever handle 44 is released, the lever handle follower 21 returns into its initial position, where another fork leg 33" strikes the other side of the stop tenon 34. Furthermore, the tension spring 13 guides the catch bolt 9 back into its normal position according to figure 2.

When the door is pulled only into the closed position, it is possible to move the catch bolt 9 forward into locking action by means of the profile closing cylinder 45. Upon counter-clockwise rotating a closing bit 46, it thereby acts upon the dead locking lever 24 at its thickening 28 and thus lifts off the dead locking lever 24 such that then the center web 27 is positioned above the turn pin 16. At that moment, through the engagement of the closing bit 46 into the closing contact

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aperture 15, the catch bolt 9 can be moved forward into the locking position according to figure 4. Upon the closing rotation of the closing bit 46, it releases the dead locking lever 24 for spring-loaded pivoting such that the center web 27 moves behind the turn pin 16, thus the turn pin 16 is placed in the turn aperture 26. For this reason, the catch bolt 9 can not be pushed back. Corresponding push-back forces are guided via the dead locking lever 24 into the lock bottom-sided stay tenon 29. The backward moving displacement of the catch bolt 9 can only be realised by the key actuation and more precisely after preceding lifting of the dead locking lever 24 and the displacement of catch bolt 9 against the resistance of the tension spring 13.

In case a not-shown turning door knob is used instead of the door lever handle 44, the spring resistance acting upon the lever handle follower 21 has to be reduced, therefore the pin 37 is placed into the position according to figure 5.

With the catch bolt moved forward into the locking position, the cam projection 19 is placed outside the moving range of the arm 20 of the lever handle follower 21, such that a displacement of the lever handle follower 21, either by means of a door knob or a door lever

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handle 44, does not result in a contact at the catch bolt tail 8.

The further embodiment shown in figures 11 to 14 almost corresponds to the first embodiment. Therefore the same components are identified by the same reference numerals. With the exception that, in this embodiment, a second follower 47, supported in the lock bottom 3 and the lock cover 22, is used instead of the profile closing cylinder 45. Such lock 1' can be used for example for washroom doors. The second follower 47 is equipped with a closing bit 48, having a function similar to the closing bit 46 of the profile closing cylinder 45 and being assigned to two lock casing-sided stopping shoulders 56, 57. The second follower 47 of this lock 1' is preferably equipped with a turning knob on the door inside. Consequently, the catch bolt 9 can be retracted by means of the lever handle follower 21, like in the first embodiment, compare with figure 12. Furthermore, the catch bolt 9 can be moved forward into the locking position by means of a door-sided turning knob assigned to the second follower 47, whereby the closing bit 48 interacts with the dead locking lever 24 as well as with the catch bolt tail 8. The position according to figure 13 is thus achieved. Opening a door

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equipped with the lock 1' first requires the retraction of catch bolt 9 by means of the second follower 47. Thereupon it is possible to completely retract the catch bolt 9 by means of the lever handle follower 21.

In case a door lever handle 44 is assigned to the lever handle follower 21, the pin 37 takes the position according to the figures 11 to 13. The spring 35 then acts with higher resistance upon the lever handle follower 21. When using a turning knob for the lever handle follower 21, the pin 37 must be placed into the position according to figure 14.

Yet another embodiment could almost largely correspond to the first embodiment. Instead of the profile closing cylinder 45, a keyhole for a closing bit would be provided in the lock bottom 3 and in the lock cover, by which means the lock equipped with a dead locking device can be locked and unlocked.

References:

1	Lock
1'	Lock
2	Lock casing
3	Lock bottom
4	Longitudinal lateral wall
5	Longitudinal lateral wall
6	Back wall
7	Front wall
8	Catch bolt tail
8'	Fork leg
8''	Fork leg
9	Catch bolt
10	Catch bolt head
10'	Latch ramp
11	Aperture
12	Tenon
13	Tension spring
14	Stay tenon
15	Closing contact aperture
16	Turn pin
17	Longitudinal slot
18	Guiding tenon
19	Cam projection
20	Arm
20'	Nose
21	Lever follower
22	Lock cover
22'	Lock cover
23	Sliding surface
24	Dead locking lever
25	Turn aperture
26	Turn aperture
27	Center web
28	Thickening
29	Stay tenon
30	Angled portion
31	Projection
32	Pressure spring
33	Fork sparing
33'	Fork leg
33''	Fork leg
34	Stop tenon
35	Spring

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36	Tenon projection
37	Pin
37'	Contact opening for tools
38	Longitudinal slot
39	Flattening
40	Slot wall
41	Slot section
42	Slot section
43	Support surface
44	Door lever handle
45	Profile closing cylinder
46	Closing bit
47	Follower
48	Closing bit
56	Stopping shoulder
57	Stopping shoulder
P	Spring contact point

Claims

1. Lock with a catch bolt (9) protruding out from a lock casing (2), which catch bolt's tail (8), displaceably guided inside the lock casing (2), can be retracted through the contact of an arm (20) of a spring-cushioned lever handle follower (21) and upon preceding lifting of a dead locking device, can be moved forward into locking action or moved backward urged by the locking actuation by means of a key, a closing cylinder (45), a second follower (47, 49) or the like, characterised in that a dead locking device, liftable by a closing bit (46, 48), is designed as one-armed dead locking lever (24) building turn apertures (25, 26) into which engages a catch bolt tail-sided turn pin (16) and which is supported about a casing-sided stay tenon (29) arranged above a catch bolt head (10), whereby the catch bolt tail (8) presents a solidly thereto connected cam projection (19), upon which acts an arm (20) of the lever handle follower (21) and which is moved out of the swivelling range, when the catch bolt (9) is moved forward into the locking position.
2. Lock according to claim 1, characterised in that the turn apertures (25, 26) are positioned at the free end of the dead locking lever (24) and a closing bit contact point (28) approximately in its center.
3. Lock according to claim 1 or 2 characterised in that the dead locking lever (24) is spring-cushioned with regard to a lateral casing wall (4).
4. Lock according to one of the claims 1 to 3, characterised in that the cam projection (19) presents a bevelled sliding surface (23) formed for the contact of a nose (20') of the arm (20).
5. Lock according to one of the claims 1 to 4, characterised in that the arm (20) of the lever handle follower (21) is maintained by a spring (35) in an orientation parallel to the catch bolt's displacement direction.
6. Lock according to one of the claims 1 to 5, characterised in that the catch bolt tail (8) can be additionally moved forward into the locking position and moved

backward by means of a closing bit actuation, after preceding displacement of the dead locking device (dead locking lever (24))

7. Lock according to one of the claims 1 to 6, characterised in that the catch bolt tail (8) is guided close between both lateral lock walls (4, 5) and is spring-cushioned in locking direction by a tension spring (13).
8. Lock according to one of the claims 1 to 7, characterised in that the lever handle follower (21) is provided with a fork spring (33) defining a clearance and therewith embracing a lock casing-sided stop tenon (34).