

Title: Door lock, in particular with an anti-panic function

Description

- 5 The invention relates to a door lock, which is in particular provided with an anti-panic function, according to the generic part of claim 1.

Such a door lock is known from US-A 3,854,763. The latch bolt of this door lock is connected to an electro-magnet and to a so-called anti-panic
10 bar via a complicated lever gear. When activated, the electro-magnet, via the lever gear, can swing back the latch bolt into the door lock housing. This swinging back can be realized by the anti-panic bar via a lever gear as well, which is connected to the latch bolt.

- 15 The main drawback of this prior art door lock design resides in the enormous expense for two different lever gears, which, on the one hand, are complicated to manufacture and, on the other hand, are susceptible to failure.

- 20 Therefore, it is an object of the present invention to provide a door lock of the type described in the generic part of patent claim 1, which in particular is equipped with an anti-panic function, has a considerably simplified structure and has an improved operational reliability.

- 25 This problem is solved with the features of patent claim 1.

One of the particular advantages of the inventive door lock is that the lever gear, provided in the state-of-the-art for retracting the latch bolt, can be substituted by a simple flexible connecting device, which, in a particularly
30 preferred embodiment, can be executed as a wire, a cable or as a Bowden

cable. The overall construction is thus considerably simplified, because such a component can be retrofitted without any problem.

5 Pre-loading the latch bolt into the closed position can be preferably accomplished by a simple spring, which likewise reduces the total expenditure of the construction considerably.

10 In a known manner, such a door lock can be provided with an anti-panic function, which for example has an anti-panic bar, which can be pushed into the door lock housing in the direction of movement of the operator and can retract the latch bolt into the door lock housing via a lever gear, for example. In this regard, an arrangement may be chosen as the one known from US 3,854,763, which disclosed content is herewith fully incorporated by reference in the disclosed content of the present application.

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The dependent claims feature advantageous further developments of the invention.

20 Further details, features and advantages of the invention will become apparent from the following description of exemplary embodiments, reference being made to the drawings, in which:

25 Figure 1: shows a diagrammatically very simplified illustration of a first embodiment of the inventive door lock, the latch bolt thereof being disposed in the projected position,

Figure 2: shows an illustration of the door lock corresponding to Figure 1, with the latch bolt being swung inwards,

Figure 3: shows a diagrammatically simplified perspective illustration of a second embodiment of the inventive door lock with the latch bolt protruding from the door lock housing, and

- 5 Figure 4: shows an illustration corresponding to Figure 3 of the second embodiment of the inventive door lock with the latch bolt being moved back into the door lock housing.

10 A first embodiment of the inventive door lock 1 is illustrated in Figures 1 and 2. It can be equipped with a regular anti-panic function, which, however, is not relevant for the explanation of the principles of the present invention, and therefore it is not illustrated in the Figures. As a rule, such a door lock 1 is mounted onto the door leaf. Thus, appropriate doors can be retrofitted later with such a lock.

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The door lock 1 has a door lock housing 2. A latch bolt 3 is disposed at a front side 4 within the door lock housing 2 and is movable between a position, where it is projected, visible in Figure 1, and a position, where it is retracted into the door lock housing, visible in Figure 2.

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Furthermore, the door lock 1 has a drive means 5, by means of which, when actuated, the latch bolt 3 is retractable into the door lock housing 2. For this purpose, the latch bolt 3 is connected to the drive means 5 via a connecting device 6.

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In the position, where it is protruding from the door lock housing 2, illustrated in Figure 1, into which the latch bolt 3 is pre-loaded by means of a spring, symbolized in Figure 1 by the arrow F, the door equipped with the inventive door lock 1 is closed.

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If the drive means 5 having an electric motor 9 is powered, the latch bolt 3 can be moved back into the door lock housing 2 against the force of the spring F.

5 In the embodiment illustrated in Figures 1 and 2, the latch bolt 3 is pivotally supported at a pivot pin 7 fixed at the housing. The latch bolt 3 can be pivoted about this pivot pin 7 between the positions illustrated in Figures 1 and 2. It should be noted that a displaceable latch bolt 3 can be used as well.

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The drive means 5 or its electric motor 9 has a motor shaft 11, which is provided with a diagrammatically simplified illustrated thread 10. A threaded sleeve 12, which is supported against rotation in the door lock housing 2, is disposed on the motor shaft 11 provided with the thread 10.

15 Figures 1 and 2 furthermore show limit switches 13 and 14, delimiting the displacement path of the threaded sleeve 12. For this purpose, in Figure 1, the threaded sleeve 12 actuates the limit switch 14 and, in Figure 2, the threaded sleeve 12 actuates the limit switch 13 disposed adjacent the motor 9, such that the end positions of the threaded sleeve 12 are
20 determined, because the motor 9 is respectively shut off, when the limit switches 13 and 14 are actuated.

Furthermore, a damping spring 15 is disposed around the motor shaft 11, which spring, adjacent one end 16 of the motor shaft 11, is placed around
25 the latter, this end 16 representing the end of the motor shaft 11 opposite the electric motor 9. In this case, as shown in Figures 1 and 2, the damping spring 15 is bearing against a first support 19 fixed at the housing, which support in turn is disposed adjacent the end 16.

Furthermore, the door lock housing 2 has a second support 20, placed adjacent the front side 4. Between these two supports 19 and 20, a tube-shaped hollow guiding sleeve 18 is disposed, wherein the connecting device 6, preferably in the shape of a flexible wire or cable, partially extends, as is revealed in detail in the illustration of Figures 1 and 2.

At one of its ends 23, the cable or the wire 17 is connected to the threaded sleeve 12 and at the other end 22 to the latch bolt 3, such that, when retracting the threaded sleeve 12 into the position according to Figure 2, the latch bolt 3 can be pivoted about the pivot pin 7 into the door lock housing 2. This can be seen in the combined views of Figures 1 and 2.

Furthermore, a control equipment diagrammatically indicated by block 21 for controlling or regulating the inventive door lock 1 is provided, which in particular has a timer device for controlling or regulating the pole reversal and thus the direction of rotation of the electric motor 9. When the threaded sleeve 12 is moved back from the position illustrated in Figure 1 into the position illustrated in Figure 2, it will actuate the switch 13, effecting the pole reversal and thus the direction of rotation of the electric motor 9 after an adjustable period of time. This may consequently mean that, depending on the set period of time, the latch bolt 3 may continue to remain in the position, where it is swung back into the door lock housing 2. If the latch bolt is to be pivoted again into the position illustrated in Figure 1, the motor is actuated again by the control equipment 21 and thus, on account of its pole reversal previously made, moves the threaded sleeve 12 from the position of Figure 2 into the one of Figure 1, such that the latch bolt 3, by means of the force of the spring F, can be pivoted back into the projected position according to Figure 1, without the connecting device 6 interfering with this pivoting movement.

A second embodiment of the inventive door lock 1 is illustrated in Figures 3 and 4. All parts and functions, which correspond to those of Figures 1 and 2, have the same reference numerals, such that reference is made to the above explanations for their disposition and functioning.

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The difference between the two embodiments resides in the fact that, in the second embodiment, the latch bolt 3' is disposed at a slide 8, which in turn is charged by the force of a spring F, such that, according to the illustration of Figure 3, the latch bolt protrudes from the door lock housing 2, if the threaded sleeve 12 is abutting against the limit switch 14.

If the latch bolt is to be retracted, the electric motor 9 is actuated and, in this case, the wire or the cable 17, which in this case is connected to the slide 8 with its end 22, pulls the slide 8 and thus the latch bolt 3' back into the housing, as is revealed in Figure 4.

In this embodiment as well, a pole reversal is again done in this position after an adjustable period of time, such that, as already explained above, it is possible to retract the latch bolt 3' into the position according to Figure 3.

The control or the regulation 21 could be actuated as well by a switching command from a central station or the like. An activation of the control or the regulation 21 is likewise possible by a manual push-button beside or in front of the door, this is particularly relevant for disabled persons to allow them a free passage through the door.

The drive unit 5 including the control or the regulation could be retrofitted into a lock of the species described above.

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In addition to the above described automatic actuation, an opening of the door is always possible, in particular via the anti-panic bar.

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List of References

	1	door lock
	2	door lock housing
	3	latch bolt
5	3'	latch bolt
	4	front side
	5	drive means
	6	connecting device
	7	pivot pin fixed at the housing
10	8	slide
	9	electric motor
	10	thread
	11	motor shaft
	12	threaded sleeve
15	13	limit switch
	14	limit switch
	15	damping spring
	16	end
	17	cable, wire, Bowden cable
20	18	guiding sleeve
	19, 20	first and second support
	21	control equipment
	22	end of cable
	23	end of cable
25	F	spring

Patent claims

1. A door lock (1)
 - with a door lock housing (2);
 - 5 - with a latch bolt (3, 3'), which is disposed at a front side (4) of the door lock housing (2), and is displaceably supported between a position, where it is projecting from the door lock housing, and a position, where it is retracted into the door lock housing, and
 - 10 - with a drive means (5) by means of which, when actuated, the latch bolt (3, 3') is retractable into the door lock housing (2),
 - the latch bolt (3, 3') being pre-loaded by a spring (F) into the position, where it projects from the door lock housing (2);
 - characterized in that
 - 15 - the drive means (5) has an electric motor (9), which is connected to a motor shaft (11) located on the output side and being provided with a male thread (10), a threaded sleeve (12), which is disposed axially movable on the motor shaft (11), and a flexible connecting device (6) which is
 - 20 coupled to the threaded sleeve (12) and to the latch bolt (3, 3'), and
 - furthermore control equipment (21) is provided, which causes the latch bolt (3, 3') to pause for a predetermined period of time in the position, where it is retracted into the door lock
 - 25 housing.
2. A door lock according to claim 1, characterized in that the latch bolt (3, 3') is pivotally supported, between the retracted and the

projected positions, about a pivot pin (7), which is fixed at the housing.

3. A door lock according to claim 1, characterized in that the latch bolt (3') is disposed at a slide (8), which is supported longitudinally movable in the door lock housing (2).
4. A door lock according to any of the claims 1 to 3, characterized in that the threaded sleeve (12) is supported against rotation in the door lock housing (2).
5. A door lock according to claim 4, characterized in that limit switches (13, 14) are disposed in the door lock housing (2) for limiting a displacement path of the threaded sleeve (12).
6. A door lock according to claim 4 or 5, characterized in that a damping spring (15) is disposed at an end (16) of the motor shaft (11), which is opposite the electric motor (9).
7. A door lock according to any of the claims 1 to 6, characterized in that the connecting device (6) has a flexible wire or a cable (17).
8. A door lock according to claim 7, characterized in that the wire or the cable (17) partially extends through a guiding sleeve (18).
9. A door lock according to claim 8, characterized in that the guiding sleeve (18) extends between a first support (19), fixed at the housing and disposed adjacent the end (16), and a second support (20) adjacent the front side (4).
10. A door lock according to any of the claims 7 to 9, characterized in that a first end (22) of the wire or of the cable (17) is attached at the threaded sleeve (12) and the other end (23) at the latch bolt (3).

11. A door lock according to any of the claims 7 to 9, characterized in that a first end (22) of the wire or of the cable (17) is attached to the threaded sleeve (12) and a second end (23) to a slide (8) according to claim 3.
- 5 12. A door lock according to any of the preceding claims, characterized in that the latch bolt (3, 3') is projected out of the door lock housing (2) by means of the drive means (5) through commutating the direction of rotation of the electric motor (9).
- 10 13. A door lock according to claim 12, characterized in that the control equipment (21) has a timer device, which, by means of an automatic time delay control of the commutation of the direction of rotation of the electric motor (9), causes the latch bolt (3, 3') to pause.
- 15 14. A door lock according to any of the preceding claims, characterized in that the drive means (5) with the electric motor (9), the threaded sleeve (12), the motor shaft (11), and the control equipment (21) can be retrofitted.
- 20 15. A door lock according to any of the preceding claims, characterized in that it is furthermore equipped with an anti-panic function.
16. A door closer according to one of the preceding claims, characterized in that it can be mounted to a door leaf.