

DOOR LOCK WITH FULLY-OPEN LATCH BACKGROUND OF THE INVENTION

The present invention relates to door locks and in particular to a door lock which has a latch that, when unlocked, will fully open to clear its way from a gate post.

A door lock which comprises a combined body defining an access opening and receiving at least one lockset, a dual-actuator movable by the at least one lockset, a striker movable by the dual-actuator, and a latch slidable on the combined body between a locked position in which the latch engages with the striker and closes the access opening and an unlocked position in which the access opening is cleared, is generally known. However, in this type of door lock, it is found that the latch, during a sliding movement from the locked position to the unlocked position, usually stops at the midway, i.e., a partially unlocked position, due to an insufficient force acting on it by a flanged ring which performs a linear movement of a limited, short stroke. The latch stopping at the midway may interfere with the smooth opening of the door or gate, or even cause damage to the latch, because movement of the latch at this position will be stopped by gate post. It then becomes necessary for one to manually move the latch back to its intended unlocked position. It is further found that if a strong spring is employed to drive the flanged ring, the latter will be subjected to wear and damage easily and quickly.

The present invention aims to obviate the above inconvenience of manual operation and potential damage to the latch.

BRIEF SUMMARY OF THE INVENTION

The present invention provides a spring which is compressed by the latch when the latter is at a locked position and which fully extends to urge the latch to an unlocked position. With the provision of the spring which may fully extend due to its restoring force, the latch will not

obstruct or interfere with a subsequent opening of a door.

Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

Fig. 1 is an exploded view of a door lock in accordance with the present invention;

Fig. 2 is a schematic view showing the door lock of Fig 1 in an assembled state mounted to a door;

Fig. 3 is a cross-section of the assembled door lock shown in a locked state; and

Fig. 4 is a cross-section of the assembled door lock shown in an unlocked state.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawing figures and initially to Figs. 1 and 2, the components of a door lock constructed in accordance with the present invention and its environment of use can be seen. The door lock generally comprises a combined body 10, a dual-actuator 30, a striker 50 and a latch 60. The dual-actuator 30 and the striker 50 are accommodated and concealed within the combined body 10, while the latch 60 is slidably received by the combined body 10 and both its locked and unlocked positions are shown in Fig. 2.

The combined body 10 is composed of a main body 12 and a leg 14 to be fixedly connected to the main body 12 by screws 11 which are in turn concealed by force-fitted caps 13. When the main body 12 and the leg 14 are connected, an access opening 15 is defined therebetween. As is known, the combined body 10 is to be securely mounted to an angled bar 92 constituting part of a portion of door 90 (see Fig. 2) so that, when the

access opening 15 is closed by the latch 60, part 94 of another door portion is enclosed and confined by the lock. Only when the latch 60 is released by a key can the access opening 15 be cleared to allow opening of the door 90. The combined body 10 further receives at least one lockset (two are seen in the embodiment shown). A lockset as used herein refers to one which is complete in function and generally comprises a lock core 16 and associated tumbler means 18 and suitably supported within the main body 12 so that a suitable key can be used to control a turning movement of a blade protruding outward from a rear end of the lock core 16. The dual-actuator 30 is composed of a primary actuator 32, a secondary actuator 34 and a spring 36 compressed between the primary and secondary actuators 32 and 34 and tending to bias the secondary actuator 34 away from the primary actuator 32. The combination of the primary actuator 32, the secondary actuator 34 and the spring 36 is then suitably positioned within the main body 12. The striker 50 has an engaging end 52 and a recessed portion 54 formed on a lateral side thereof. The latch 60 has an annular groove 62 adjacent to an end thereof. The annular groove 62 is defined by a tapered side face 622 and a straight side face 624.

Referring also to Figs. 3 and 4, a number of required holes are defined within the main body 12 and the leg 14, respectively, for accommodating the dual-actuator 30, the striker 50, the latch 60 and the two locksets and related components not specifically numbered. The dual-actuator 30 is situated within one such hole of the main body 12 between the lock core 16 and the striker 50, with the primary actuator 32 bearing against the blade of the lock core 16 and the secondary actuator 34 bearing against the recessed portion 54 of the striker 50 under the action of a restoring force exerted by the spring 36 that is compressed between the primary and secondary actuators 32 and 34. Therefore, the

dual-actuator 30, in particular the primary actuator 32, is movable by the rear blade of any one of the two locksets. The striker 50 is received in another hole of the main body 12 and is biased by a spring 56 and sealed by a cap 58. The engagement of the dual-actuator 30 with the recessed portion 54 of the striker 50 will now be detailed. The primary actuator 32 has a tapered end and the recessed portion 54 has a complementary shape, i.e., a tapered face is formed on the recessed portion 54. With such design in shape, a linear movement of the primary actuator 32, overcoming the spring forces of both the springs 36 and 56, will be converted into a linear movement of the striker 50 in a direction perpendicular to that of the primary actuator 32. Namely, in reference the orientation of Figs. 3 and 4, an upward movement of the primary actuator 32 will effect a leftward movement of the striker 50. Of course, when in the state shown in Fig. 3, an uppermost end of the tapered end of the primary actuator 32 is spaced from a bottom face of the recessed portion 54 a predetermined distance substantially equal to a maximum stroke of the primary actuator 32 which is sufficient to move the striker 50 leftward to disengage the engaging end 52 of the striker 50 from the annular groove 62 of the latch 60.

In the state shown in Fig. 3, the annular groove 62 of the latch 60 is engaged with the engaging end 52 of the striker 50 and the striker 50 is at its rightmost position. To fully move the latch 60 from this locked position to the unlocked position shown in Fig. 4 without any manual operation, in accordance with the present invention, a spring 70 is provided within a hole of the main body 12. It is noted that the latch 60 is prevented from movement at this position because the presence of the straight side face 624 and the spring 70. A flanged ring 72 is provided as fixed in a hole of the main body 12 by, for example, a pin 74. The spring 70 has a first portion 702 of a diameter small enough to extend through

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the flanged ring 72 and a second portion 704 of a diameter sufficiently large to be blocked by a flange 722 of the flanged ring 72. With the aid of the flanged ring 72, the spring 70 itself can be retained in place, while performing a desired movement in a controlled manner as will be detailed later. In the embodiment shown, the second portion 704 of the spring 70 constitutes about one coil turn or pitch of the spring. In the state shown in Fig. 3, the spring 70 is compressed at its first portion 702 by an end of the latch 60. Subsequent to turning of a key so as to disengage the engaging end 52 from the annular groove 62 of the latch 60 as shown in Fig. 4, the spring 70 will fully extend or bounce back in such a way that the force exerted on the latch 60 is sufficient to bring the latch 60 to the unlocked position in which the annular groove 62 is stopped by a pin 64 engaging with the annular groove 62 under the action of a spring 66. As can be understood, to bring the latch 60 to its locked position, one has to manually slide the latch 60. Due to provision of a tapered end, the striker 50 will be pressed leftward (inward). After the annular groove 62 is aligned with the engaging end 52, the state shown in Fig. 3 is achieved.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.



CLAIMS

1. In a door lock comprising: a combined body defining an access opening and receiving at least one lockset; a dual-actuator movable by the at least one lockset; a striker movable by the dual-actuator; and a latch slidable on the combined body between a locked position in which the latch engages with the striker and closes the access opening and an unlocked position in which the access opening is cleared, the improvement wherein:

a spring is compressed by an end of the latch when the latch is at the locked position and fully extends to urge the latch to the unlocked position.

2. The door lock as claimed in claim 1, wherein the spring has a first portion of a diameter small enough to extend through a flanged ring which is confined in place with respect to the combined body and a second portion of a diameter sufficiently large to be blocked from passing by a flange of the flanged ring.

3. The door lock as claimed in claim 2, wherein the second portion of the spring constitutes about one pitch of the spring.