

LOCK ASSEMBLY INCLUDING BOLT HOLD BACK FUNCTION

This invention relates to a lock assembly including a housing, a latchbolt that is movable between an extended position and a retracted position relative to the housing and a retainer means for retaining the latchbolt in the retracted position. Locks of this kind are often used to secure doors in a closed position, and one form of lock assembly is a mortice lock. It will be convenient to hereinafter describe the invention with reference to a mortice lock assembly for use with a door, however the invention may come in other forms of lock and have other uses.

A mortice lock assembly is designed for installation in a mortice cavity formed through an edge of the door. The lock assembly includes a bolt that is movable between an extended and retracted position. The mortice lock assembly can include a biasing means, such as a spring, for urging the bolt to adopt the extended position. The door is held in a closed position when the bolt is in the extended position, and engaging an adjacent strike plate in a jamb or the like. In order to move the door from the closed position the latchbolt must be moved from the extended position. It can often be convenient to be able to move the door from the closed position without having to move the bolt from the extended position which will be explained below.

A mortice lock assembly generally includes a handle operated actuator that is operable to retract the latchbolt. A key operated lock means such as a cylinder lock is generally included to permit an authorised user with a key to control operation of the actuator. An automated door closer may be used to return the door to the closed position and it can be preferable for the door to be capable of being moved from the closed position without operation of the actuator. This situation may occur in a public building such as a library or a shop.

The building may require a lock assembly to secure a door in a closed position at night, however during the day it may be desirable to make it easier for pedestrians to move through a doorway. This is particularly the case if the doorway is used by a high volume of pedestrians who expect easy access to the building. In these situations it is desirable for the lock assembly to have a

latchbolt hold back function, whereby the building operator such as shop owner or librarian can restrain the latchbolt in the retracted position.

5 A hold back function may be initiated by moving the latchbolt to the retracted position by operation of the actuator however it is generally as a result of direct depression of the head of the bolt provided the door is not in the closed position. Once in the retracted position the latchbolt is held in the retracted position by elements generally associated with the keyed lock means. This ensures that the hold back function is controlled by the authorised user.

10 A mortice lock assembly may be used in a range of situations that require different functions. A single building may have a front door where it is desirable for the lock assembly to have a hold back function, while the stairwell in the same building may have a fire door where a hold back function is not desirable. A fire door needs to be able to be retained in a closed position to reduce the egress of smoke into the stairwell, and the mortice lock assembly may be relied upon to
15 achieve this. Accordingly it would be preferable that a mortice lock assembly installed in such a situation was incapable of permitting the authorised user to restrain the latchbolt in the retracted position.

It will be appreciated that it is the responsibility of the lock installer to ensure that the lock having the desired function is installed in the appropriate door. The
20 lock installer may be required to fit the lock before the door is hung, in which case the desired functionality of the lock may not be known. Alternatively the door may be hung with a mortice lock having an inappropriate hold back function, in which case the mortice lock will need to be removed from the mortice cavity and replaced with a more appropriate mortice lock.

25 It is preferably desirable to provide a lock assembly including a hold back function that is relatively simple in its assembly. It is also preferably desirable that the lock assembly is adjustable to suit for more than one situation

According to one aspect of this invention there is provided a lock assembly including a housing, a latchbolt movable between an extended position and a
30 retracted position relative to a front of the housing, biasing means for biasing the latchbolt towards the extended position, a retainer means that when the latchbolt

is in the retracted position the retainer means can prevent movement of the latchbolt from the retracted position by adopting a first position, or not prevent movement of the latchbolt from the retracted position by adopting a second position, wherein when the latchbolt is away from the retracted position and the retainer member is in the first position, movement of the latchbolt to the retracted position causes the retainer member to adopt a third position whereby it does not prevent movement away from the retracted position, whereby the retainer means flexes as it adjusts from the first position to the third position.

It is preferred that the retainer means includes an elongate member that has a fixed end and a free end, the free end moves relative to the fixed end when the retainer member adjusts from the first position to the third position. The elongate member preferably flexes away from a front of the housing when adopting the third position and is urged towards the front of the housing when preventing movement of the latchbolt from the retracted position. The elongate member is preferably supported relatively adjacent the free end when preventing movement of the latchbolt from the retracted position, and supported relatively remote from the free end when adjusting to the third position.

It is preferred that the lock assembly includes an actuator operable to move the latchbolt from the extended position to the retracted position, lock means that is adjustable between an active condition so as to render the actuator inoperable and an inactive condition so as to render the actuator operable, the retainer means is adjustable between the first position and the second position with the adjustment of the lock means between the active condition and the inactive condition respectively. The lock means preferably includes a detent slide that slides when the lock means is adjusting between the active condition and the inactive condition, wherein the retainer means is connected to the detent slide to move therewith.

It is preferred that the lock assembly includes a selector operable for interaction with the retainer means, whereby when the selector selects an inactive condition the retainer is inoperable to prevent movement of the latchbolt from the retracted position when the retainer means is in the first position. The selector is preferably operable from a front of the housing. The head of the

latchbolt is preferably moveable in an axial direction between the extended position and the retracted position and is rotatable about the axis between an operative position and an adjustment position, the head preventing operation of the selector when in the operative position and permitting operation of the selector when in the adjustment position. The lock assembly preferably includes a face plate attached to a front of the housing, the face plate when attached to the housing prevents rotation of the head to the adjustment position. The face plate is preferably attached to the housing with at least one fastening element.

It is preferred that the latchbolt includes a member positioned to the rear of the head of the latchbolt and movable relative to the head when the selector is adjusted between an active condition in which the latchbolt is restrained in the retracted position once the retainer is moved to the first position and the inactive condition.

According to another aspect of this invention there is provided a mortice lock assembly including a housing, a latchbolt movable between an extended position and a retracted relative to a front of the housing, biasing means for biasing the latchbolt towards the extended position, a retainer means that when the latchbolt is in the retracted position the retainer means can prevent movement of the latchbolt from the retracted position by adopting a first position, or not prevent movement of the latchbolt from the retracted position by adopting a second position, wherein when the latchbolt is away from the retracted position and the retainer member is in the first position, movement of the latchbolt to the retracted position causes the retainer member to adopt a third position whereby it does not prevent movement away from the retracted position, a selector operable from a front of the housing for interaction with the retainer means, whereby when the selector selects an inactive condition the retainer is inoperable to prevent movement of the latchbolt from the retracted position when the retainer means is in the first position.

It is preferred that the head of the latchbolt is moveable in an axial direction between the extended position and the retracted position and is rotatable about the axis between an operative position and an adjustment position, the head preventing operation of the selector when in the operative position and permitting

operation of the selector when in the adjustment position. The mortice lock assembly preferably includes a face plate attached to a front of the housing, the face plate when attached to the housing prevents rotation of the head to the adjustment position. It is preferred that the face plate is attached to the housing with at least one fastening element. It is further preferred that the latchbolt includes a member positioned to the rear of the head of the latchbolt and movable relative to the head when the selector is adjusted between an active condition in which the latchbolt is restrained in the retracted position once the retainer is moved to the first position and the inactive condition.

10 It is preferred that the lock assembly is a mortice lock assembly.

The above discussion of lock assemblies is included in the specification solely for the purpose of providing a context for the present invention. It is not suggested or represented that any of these lock assemblies form part of the prior art base or were common general knowledge in the field relevant to the present invention as it existed in Australia before the priority date of this invention.

It will be convenient to hereinafter describe the invention in greater detail by reference to the accompanying drawings showing two example embodiments of the invention. The particularity of the drawings and the related detailed description is not to be understood as superseding the generality of the broad definition of the invention as provided by the claims.

Figure 1 is a side elevation view of a mortice lock assembly with the cover removed showing the latch bolt in a retracted position and the lock means in an inactive position.

25 Figure 2 illustrates the mortice lock assembly from Figure 1 with the latch bolt in the extended position and the lock means in the active condition.

Figure 3 illustrates selected components of the mortice lock assembly from figure 1 in an exploded view.

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Figure 4 illustrates a side elevation of the latch bolt assembly with the latchbolt in the extended position and the lock means in the active position.

Figure 5 illustrates a detailed view of the interaction of the retainer with the hook corresponding to figure 1 whereby the retainer is in a second position.

5 Figure 6 illustrates a detailed view of the interaction of the retainer with the hook corresponding to figure 2 whereby the retainer is in a first position.

Figure 7 illustrates a detailed view of the interaction of the retainer with the hook corresponding to figure 4 whereby the retainer is in a first position.

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Figure 8 illustrates a detailed view of the interaction of the retainer with the hook with the retainer flexing whereby the retainer is in a third position.

15 Figure 9 illustrates an alternate embodiment of the latch bolt assembly in an exploded view.

Figure 10a is a side elevation of the latch bolt assembly from figure 9 with the selector in an inactive position.

20 Figure 10b is a front elevation view of the latch bolt assembly from figure 10a.

Figure 11a is a side elevation of the latch bolt assembly from figure 9 with the selector in an active position.

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Figure 11b is a front elevation view of the latch bolt assembly from figure 11a.

30 The figures illustrate a preferred embodiment of the lock assembly according to the invention, in the form of a mortice lock assembly 1 for location in a mortice formed in a side edge of a door (not shown). The lock assembly illustrated in Figure 1 includes a housing 2 with its cover (not shown) removed to reveal in summary a latch bolt 3. The latch bolt 3 is movable relative to the housing 2 between an extended position shown in Figure 4, whereby a head 6 of

the latch bolt 3 extends from a front of the housing 2, and a retracted position as shown in Figure 1 whereby the head 6 of the latch bolt 3 is retracted within the housing 2. The lock assembly 1 includes a biasing means 7 for urging the latch bolt towards the extended position. A compression spring is illustrated in Figure 1 as a preferred example of a biasing means 7 for urging the latch bolt 3 to adopt the extended position.

An actuator 4 is included to move the latch bolt 3 from the extended position to the retracted position. The preferred actuator 4 illustrated is of the split hub style which can be appreciated from figure 3 as having an inner hub 8a and outer hub 8b. Each hub 8 is connected to a handle or turn knob (not shown) on the inner or outer side of the door, and rotated about an actuation axis X-X by a user turning the handle or turn knob. The actuator also includes a drive arm 9 that interacts with both hubs 9, so that rotation of either hub 8 will cause movement of a drive arm 9 about the actuation axis X-X. The drive arm 9 interacts with the latch bolt 3 so that movement of the drive arm from the position shown in figure 4 to the position shown in figure 1 results in movement of the latchbolt to the retracted position shown in figure 1.

The lock means 5 interacts with the actuator 4 so that when the lock means is in a locked condition the inner and/or outer hubs 8 are prevented from rotation. The preferred lock means 8 illustrated in figure 1 includes an inner cam 10a and outer cam 10b (only a portion of the outer cam is visible in figure 1), that are each rotatable in response to operation of normally either a cylinder lock on the outside of the door, or a cylinder lock or snib (not shown) from the inner side of the door. Each cam 10 interacts with a cam follower 12 so that rotation of either cam 10 results in linear movement of the follower 12 in a direction substantially perpendicular to the movement of the latch bolt 3.

The follower 12 is connected to one end of a switch 13 which pivots in response to movement of the follower 12. The cams 10, follower 12 and switch 13 are located within a housing 11 to form a cam sub assembly. The housing can be formed from two parts 11a and 11b, which can be appreciated from figure 3.

An opposing end of the switch 13 is in turn connected to a detent slide 14. The detent slide 14 interacts with an inner pawl 15a and an outer pawl 15b which each interact with hubs 8a 8b respectively. When comparing figures 1 and 2 it can be noted that the lock means is adjusted from an inactive position in figure 1 to an active position in figure 2. In the active position in figure 2 the outer pawl 15b moves to a position whereby it prevents the outer hub 8b from rotating. Accordingly by way of clarification the lock means 5 includes the features of the inner cam 10a, outer cam 10b, follower 12, switch 13, detent slide 14, inner pawl 15a and outer pawl 15b.

The lock assembly illustrated in figure 1 also includes a face plate 17 that is attached to the front of the housing 2. The face plate 17 is attached using fastening elements preferably in the form of threaded fasteners 18, only one of which is visible in the illustrations. The threaded fasteners 18 allow for easy removal of the face plate 17 for reasons that will be explained later in the specification. The face plate includes an aperture (not shown) to allow the head of the latch bolt 3 to pass therethrough, but otherwise the face plate 17 obstructs access to the front of the housing 2.

The latch bolt assembly 3 illustrated in Figure 3 is one preferred form and another preferred form will be described later in the specification. The latchbolt assembly illustrated includes the head 6 attached to a body 19. The latchbolt assembly also includes a bar 30 which is shown in other illustrations fixed to the body 19. The bar 30 could alternatively be formed integrally with the body 19. The bar 30 includes a hook 33 at one end which is designed to interact with other components of the mortice lock assembly as will be hereinafter described.

The lock assembly includes a retainer means 29 that is operable to prevent movement of the latch bolt 3 from the retracted position. The retainer means 29 is selectively active so that it is operable when the lock assembly is in the locked condition, and is inoperable when the lock is in an unlocked condition. Any form of selectively active retainer means 29 would be suitable for the invention, and the embodiment illustrated in figure 3 is only one form of suitable retainer means

The retainer means 29 is illustrated in figure 3 in its preferred form as an elongate member 29. The elongate member is fixed at one end 50 to the detent slide 14, and the detent slide 14 is provided with a notch 51 for facilitating the fixture. The elongate member 29 also includes a free end 52 that can interact with the hook 33. Figure 1 illustrates the lock means 5 in an inactive position, which locates the retainer 29 in a second position whereby the free end 52 does not locate within the hook 33. When the lock means 5 is adjusted to the active position as shown in figure 2, the retainer is moved to a first position whereby the free end 52 is located behind the hook 33. This change can be more easily appreciated from comparing figures 5 and 6. When the free end 52 is located behind the hook 33, the latchbolt 3 is restrained from moving from the retracted position.

The retainer 29 in one embodiment is flexible. It should be noted from figure 7 that the retainer 29 is supported by the actuator housing 54, relatively adjacent the free end 52 when resisting movement of the latchbolt from the retracted position. The flexibility of the retainer 29 is such that there is no or negligible flex when the resisting the retraction of the latchbolt 3. However there is discernable flex of the retainer 29 when moving to a third position as illustrated in figure 8. Figure 7 illustrated the lock means 5 in the active position and the latchbolt in the extended position. Moving the latchbolt to the retracted position as illustrated in figure 8 causes the retainer 29 to flex adjacent its connection with the detent slide 14. It will be appreciated that this connection is substantially more remote from the free end 52, and therefore there is discernable flexing of the retainer 29. The result of this is that the retainer 29 does not retain the latchbolt 3 in the retracted position when it is in the third position.

Figure 9 illustrates an alternate embodiment of the latch bolt assembly 3, where like features from the previous embodiment have been given the same reference numerals. In this embodiment the head 6 is attached to the body 19 by way of a threaded bolt. An axis Y-Y of the latch bolt 3 extends through the threaded bolt 20. The body 19 of the latch bolt 3 illustrated includes a mount portion 21 and a chassis portion 22. The mount portion 21 includes a pair of flanges 23, 24, each flange having an aperture 26, 27 through which the threaded bolt 20 extends. The chassis portion includes a flange 28 at a front and with an

aperture (not shown) for receiving the threaded bolt 20. The near end of the chassis portion 22 interacts with the drive arm 7 in the same manner as the previous embodiment. The bar 30 positioned to the rear of the head 6 of the latch bolt 3. The bar 30 includes a tab portion 31 that when the latch bolt 3 is assembled is located in a slot 32 formed in the mount portion 21. This arrangement of the tab 31 and slot 32 facilitate linear movement of the bar 30 relative to the mount portion 21. The latchbolt assembly 3 in this embodiment includes a selector 74 which is operable for selecting the condition of the retainer means 29. Any form of selector 34 would be suitable, however the preferred form of selector illustrated in Figure 9 is a rotatable disc having a centrally located boss 35 for location in an aperture 36 formed in the mount 21 of the latch bolt 3. The disc includes a first leg 37 that engages the bar 30, and a second leg 38 that is accessible through a front end of the body 19 of the latch bolt 3. Movement of the second leg 38 relative to the body 19 causes rotation of the disc 34 to move the bar 30 in the axial direction YY of the latch bolt 3. This adjustment can be seen in Figures 10 and 11 whereby Figure 10 shows bar 30 in a retracted position corresponding to the retainer means in an inactive condition. The disc 34 has been rotated in Figure 11 by moving the second leg 38 upwards so as to adjust the position of the bar 30 so that the retainer means adopts the active condition..

Figures 10 and 11 also illustrate the head 6 of the latch bolt 3 rotated through 90° about the axis xx of the latch bolt 3. This exposes the second leg 38 of the selector 34 so as to allow adjustment of the retainer means 29 between the inactive and active conditions. The head 6 of the latch bolt 3 shown in Figures 10 and 11 is considered to be in an adjustment position and needs to be rotated through 90° to an operative position as shown in Figures 1 and 2 in order to allow movement of the head 6 between the extended and retracted positions.

The face plate 17 is configured such that when attached to the housing 2 it prevents rotation of the head 6 of the latch bolt 3 from the operative position to the adjustment position. It ought to be appreciated therefore that the face plate 17 needs to be detached from the housing 2 before the retainer means 29 can be adjusted between an inactive and an active condition.

It ought to be appreciated from the foregoing description that the lock assembly according to the invention provides for situations where a hold back function for the latch bolt may or may not be required. This flexibility reduces the amount of stock that locksmiths may be required to hold. Locating the selector
5 behind the head of the latch bolt, that can only be rotated once the face plate has been removed, provides a particular advantage.

Various alterations and/or additions may be introduced to the lock assembly without parting from the spirit or ambit of the invention as defined by the claims.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A lock assembly including a housing, a latchbolt movable between an extended position and a retracted position relative to a front of the housing, biasing means for biasing the latchbolt towards the extended position, a retainer means for biasing the latchbolt towards the retracted position, a retainer means that when the latchbolt is in the retracted position the retainer means can prevent movement of the latchbolt from the retracted position by adopting a first position, or not prevent movement of the latchbolt from the retracted position by adopting a second position, wherein when the latchbolt is away from the retracted position and the retainer member is in the first position, movement of the latchbolt to the retracted position causes the retainer member to adopt a third position whereby it does not prevent movement away from the retracted position, whereby the retainer means flexes as it adjusts from the first position to the third position.
2. A lock assembly according to claim 1 wherein the retainer means includes an elongate member that has a fixed end and a free end, the free end moves relative to the fixed end when the retainer member adjusts from the first position to the third position.
3. A lock assembly according to claim 2 wherein the elongate member flexes away from a front of the housing when adopting the third position and is urged towards the front of the housing when preventing movement of the latchbolt from the retracted position.
4. A lock assembly according to claim 2 or 3 wherein the elongate member is supported relatively adjacent the free end when preventing movement of the latchbolt from the retracted position, and supported relatively remote from the free end when adjusting to the third position.
5. A lock assembly according to any one of claims any one of the preceding claims including an actuator operable to move the latchbolt from the extended position to the retracted position, lock means that is adjustable between an active condition so as to render the actuator inoperable and an inactive condition so as to render the actuator operable, the retainer means is adjustable between the first position and the second position with the adjustment of the lock means between the active condition and the inactive condition respectively.

6. A lock assembly according to claim 5 wherein the lock means includes a detent slide that slides when the lock means is adjusting between the active condition and the inactive condition, wherein the retainer means is connected to the detent slide to move therewith.

5 7. A lock assembly according to claim 1 including a selector operable for interaction with the retainer means, whereby when the selector selects an inactive condition the retainer is inoperable to prevent movement of the latchbolt from the retracted position when the retainer means is in the first position.

10 8. A lock assembly according to claim 7 wherein the selector is operable from a front of the housing.

15 9. A lock assembly according to claim 8 wherein the head of the latchbolt is moveable in an axial direction between the extended position and the retracted position and is rotatable about the axis between an operative position and an adjustment position, the head preventing operation of the selector when in the operative position and permitting operation of the selector when in the adjustment position.

10. A lock assembly according to claim 9 including a face plate attached to a front of the housing, the face plate when attached to the housing prevents rotation of the head to the adjustment position.

20 11. A lock assembly according to claim 10 wherein the face plate is attached to the housing with at least one fastening element.

25 12. A lock assembly according to any one of claims 7 to 11 the latchbolt includes a member positioned to the rear of the head of the latchbolt and movable relative to the head when the selector is adjusted between an active condition in which the latchbolt is restrained in the retracted position once the retainer is moved to the first position and the inactive condition.

13. A lock assembly according to any one of the preceding claims wherein the lock assembly is a mortice lock assembly.

30 14. A mortice lock assembly including a housing, a latchbolt movable between an extended position and a retracted position relative to a front of the housing,

biasing means for biasing the latchbolt towards the extended position, a retainer means that when the latchbolt is in the retracted position the retainer means can prevent movement of the latchbolt from the retracted position by adopting a first position, or not prevent movement of the latchbolt from the retracted position by adopting a second position, wherein when the latchbolt is away from the retracted position and the retainer member is in the first position, movement of the latchbolt to the retracted position causes the retainer member to adopt a third position whereby it does not prevent movement away from the retracted position, a selector operable from a front of the housing for interaction with the retainer means, whereby when the selector selects an inactive condition the retainer is inoperable to prevent movement of the latchbolt from the retracted position when the retainer means is in the first position.

15. A mortice lock assembly according to claim 14 wherein the head of the latchbolt is moveable in an axial direction between the extended position and the retracted position and is rotatable about the axis between an operative position and an adjustment position, the head preventing operation of the selector when in the operative position and permitting operation of the selector when in the adjustment position.

16. A mortice lock assembly according to claim 15 including a face plate attached to a front of the housing, the face plate when attached to the housing prevents rotation of the head to the adjustment position.

17. A mortice lock assembly according to claim 16 wherein the face plate is attached to the housing with at least one fastening element.

18. A mortice lock assembly according to any one of claims 14 to 17 wherein the latchbolt includes a member positioned to the rear of the head of the latchbolt and movable relative to the head when the selector is adjusted between an active condition in which the latchbolt is restrained in the retracted position once the retainer is moved to the first position and the inactive condition.

19. A lock assembly substantially as hereinbefore described with reference to any one of the embodiments illustrated in the attached drawings.