

A LOCK

FIELD OF THE INVENTION

5 The present invention relates to locks for use on sliding wings and to certain components used on these and other kinds of locks. The present invention may find particular use on sliding wings such as sliding doors and the like. The invention will therefore be described primarily with reference to its application in sliding doors. However, those skilled in the art will recognize that the invention may also be applicable to other forms of sliding wings, for example sliding windows, sliding panels etc, and other keyed locks.

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BACKGROUND

Locks and latches for sliding wings such as sliding doors are quite common. Some are relatively simple. For example, latches which incorporate little more than a hand operated lever on the inside of the door are in widespread use. With these latches, 15 operating the lever typically causes a hook shaped latch tongue (often called a "parrot beak") to rotate out from the front edge of the door. Consequently, when the door is closed and the lever is operated, the parrot beak rotates out of the edge of the door and engages with a strike or keeper in the doorframe thereby securing the door to the doorframe (i.e. latching the door closed). The lever can also be used to disengage the 20 parrot beak allowing the door to be opened. However, these kinds of simple sliding door latches are quite insecure. Indeed, for some of these latches it is possible to simply lift the door in order to disengage the parrot beak from the strike or keeper, and hence allow the door to be slid back open. Therefore these kinds of simple locks are now generally only used for internal sliding doors where there is also an external sliding "security" door 25 with a more secure lock.

There are also a number of more secure sliding door locks available. These more secure locks are often used on sliding "security" doors as described above, and also in situations where there is only one sliding door making it necessary to provide a more secure lock. 30 Many of these locks incorporate a key cylinder that can be operated using an appropriate key to rotate the parrot beak (or sometimes two parrot beaks) into the locked position.

The key cylinder may be provided in place of, or more commonly in addition to the lever for operating the parrot beak. Some locks also incorporate a mechanism for securing the parrot beak in the locked position (i.e. to "deadlock" the lock). Examples of sliding door locks with deadlock mechanisms are given in our co-pending Australian Patent
5 Application No 2003257261 and our co-pending International Patent Application No PCT/AU2006/001744 each of which may be referred to in order to obtain a broader understanding of the general field of locks for sliding doors and the like.

Generally, in sliding door locks that have a deadlock mechanism, the parrot beak(s) can
10 be rotated to lock the door using either the lever or the key cylinder. If the door is simply "locked" or "latched", the lever and the key cylinder can also both be used to unlock the door by retracting the parrot beak(s), thereby allowing the door to be opened. However, if the lock is "deadlocked", it generally is not possible to retract the parrot beak(s) using the lever. Consequently, the key cylinder must be operated to undeadlock the lock if the
15 door is to be opened.

It is a common problem that the more secure locks described above, and particularly ones having a deadlock facility, involve complicated internal mechanisms. This complexity can make the manufacture the locks, and their assembly, difficult and intricate. This can
20 in turn add to the overall cost of the locks. Consequently, it might be preferable if a lock could be provided for sliding doors and other sliding wings that has a deadlock facility, but where the deadlock facility is achieved using a simpler and more easily produced and assembled mechanism than existing locks.

25 Another difficulty with many existing sliding door locks, including the more secure key operated sliding door locks, arises from the fact that the lock furniture often incorporates a handle that can be grasped to slide the door (or other wing) open and closed. So that the handle does not interfere with the operation of the key cylinder and/or lever of the lock, the handle will generally be offset to one side of the lock furniture making the lock
30 furniture asymmetrical about its vertical axis. The handle almost always extends (often in an arc shape) towards the rear edge of the sliding door (i.e. away from the front edge of

the door). If the handle were to extend towards the front edge of the door (i.e. towards the edge of the door that engages with the doorframe) the handle might collide with the doorframe as the door is closed.

5 This asymmetrical shape of the handle and lock furniture often results in sliding door locks being "handed". In this specification, a sliding door or other sliding wing will be described as left-handed if it slides open from right to left as viewed by the person opening it. Conversely, the wing will be described as right-handed if it slides open from left to right. Consequently, in sliding wings such as sliding doors which can be opened
10 from either side, one side will be left-handed and the other side will be right-handed. Similarly, a lock that is designed to be installed on the left-handed side of the door or wing will be described as a left-handed lock, and a lock designed to be installed on the right-handed side will be described as right-handed.

15 Because many existing locks are handed due to the asymmetrical shape of the furniture and handle, most left-handed locks cannot be installed on the right-handed side of the door, and vice versa. This is because, if a left-handed lock (in which the handle extends out to the left from the furniture) were to be installed on the right-handed side of a door (where the front edge of the door is on the left), the lock would need to be "flipped over"
20 to make the handle face right so as not to collide with the doorframe as the door closed. Flipping the lock over in this way would invert the lock components which then may not be correctly positioned (or which may not work at all) in the inverted configuration. There would therefore appear to be an advantage if a lock could be provided for sliding wings which could be configured for use as both a left handed and a right handed lock. It
25 would be particularly advantageous if such a lock could be converted between the two "handednesses" without requiring substitution of any parts for alternative parts in performing the conversion. This would enable a single lock to be sold and then configured for the appropriate handedness, without requiring alternative parts for each different handedness, or any adapters etc. It would also be advantageous for the lock to be
30 of the more secure variety having a key cylinder, particularly if the key cylinder of the lock could be turned in the conventional directions (i.e. a conventional direction to lock

the lock and a conventional opposite direction to unlock the lock) irrespective of which handedness the lock is in. Maintaining conventional key turning directions for the left and right handednesses of the lock would be preferable because users often become accustomed to turning the key one way to lock the lock and the other way to unlock the lock. For instance, in many locks it is conventional for the top edge of the key (i.e. the edge of the key that faces upwards when the key is inserted into the key cylinder) to be rotated from its insertion position towards the front edge of the door to lock the lock, and in the opposite direction to unlock the lock. If the key turning directions were conventional for one handedness of the lock but opposite to the convention for the other handedness, this could cause inconvenience to the user when the lock is in the handedness with the unconventional key directions. It could also create danger, for example in the case of an emergency where the lock must be operated quickly but the user is unsure which direction to rotate the key to unlock the lock.

Another problem arises in relation to the amount of "lost motion" which can be achieved using current methods for engaging the key cylinder with the components inside the lock. This problem can impact upon the above-mentioned locks for sliding wings which use key cylinders, and also other forms of locks which use key cylinders. In the present context, "lost motion" is rotation of the key in the key cylinder that does not cause corresponding rotation or other movement of the component(s) inside the lock.

In many current keyed locks, the end of the key cylinder inside the lock (i.e. the opposite end of the key cylinder's barrel to where the key is inserted) is provided with a pair of protrusions which will be referred to here as "posts". The posts are generally located at diametrically opposed locations on the circumference of the round inside end of the key cylinder barrel. The component inside the lock which engages with the end of the barrel generally has a bar or some other entraining member which becomes positioned between the posts when the lock is assembled. Therefore, when the key is turned in the cylinder in one direction (which causes the key cylinder barrel to rotate that way), one of the posts collides with one end of the bar and the other post collides with the other end of the bar. This drives the bar (and hence the component it attaches to) to rotate in the same

- direction as the key cylinder barrel. However, rotation of the key (and hence the barrel) in the opposite direction will generally cause the posts to separate and rotate away from the respective ends of the bar. The barrel can then be rotated back without either of the posts contacting the bar, and hence without operating the internal components of the lock.
- 5 However, the amount of such "lost" motion is generally limited because further back rotation of the key barrel will eventually cause posts to come into contact with the other respective ends of the bar (i.e. each post will contact with the opposite end of the bar to which it contacted originally).
- 10 In existing key arrangements, lost motion of approximately 90° of the key cylinder barrel is quite common. In other words, it is quite common to be able to rotate the barrel approximately 90° without operating the internal components of the lock. In order to increase the amount of lost motion, it has previously been proposed to reduce the size of the posts on the barrel, and hence increase the amount of possible rotation before the
- 15 posts contact with the bar. However, the increase in the amount of available lost motion achieved in this way is quite small (generally far from reaching 180°), and reducing the size of the posts can reduce the strength and durability of the posts. It has also previously been proposed to provide only a single post on the barrel so that the barrel can be rotated from one position where one side of the post contacts on one side of the bar, all the way
- 20 around to the position where the other side of the posts contacts on the other side of the bar. This would provide lost motion in excess of 180° . However, providing a single post has can impose an unbalanced force on the bar which can then cause a number of other problems.
- 25 It is an object of the present invention to at least partially address one or more of the above-mentioned problems, or at least provide a useful or commercial alternative in the marketplace.

- It will be clearly understood that mere reference herein to previous or existing locks (or
- 30 parts of locks) or other background material (including publications) or problems does not constitute an acknowledgement or admission that any locks (or parts thereof), other

material(s) of whatever kind, or problems, or any combination thereof, formed part of the common general knowledge in the field or is/are otherwise admissible prior art, whether in Australia or any other country.

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DESCRIPTION OF THE INVENTION

In a first broad form, the present invention resides in a lock for a sliding wing comprising

- a lock tongue movable between a locking position and an unlocking position to lock and unlock the wing respectively,
- 10 - an operating component which can engage with the lock tongue, the operating component being movable between a first position and a second position wherein movement of the operating component into the first position causes the lock tongue to adopt the unlocking position and movement of the operating component into the second position causes the lock tongue to adopt the locking position,
- 15 - a snib operatively associated with the operating component such that the operating component can be moved between the first and second positions by moving the snib,
- a drive component that can engage with the operating component and which is movable between a lock opening position, a lock closing position and a
- 20 deadlocking position,

wherein movement of the drive component into the lock opening position causes the operating component to adopt the first position, movement of the drive component into the lock closing position causes the operating component to adopt the second position, and movement of the drive component into the deadlocking position causes the operating

25 component to be held in the second position so that the operating component cannot be moved from the second position to the first position by the snib.

In a slight variant to this, the invention resides in a lock for a sliding wing comprising

- a lock tongue movable between a locking position and an unlocking position to
- 30 lock and unlock the wing respectively,

- an operating component which can engage with the lock tongue, the operating component being movable between a first position and a second position wherein movement of the operating component into the first position causes the lock tongue to adopt the unlocking position and movement of the operating component into the second position causes the lock tongue to adopt the locking position,
- a snib that can engage with the operating component to move the operating component between the first and second positions,
- a rotating component that can also engage with the operating component and which is rotatable between an opening position, a closing position and a deadlocking position,

wherein rotation of the rotating component into the opening position causes the operating component to adopt the first position, rotation of the rotating component into the closing position causes the operating component to adopt the second position, and rotation of the rotating component into the deadlocking position causes the operating component to be held in the second position so that the operating component cannot be moved from the second position to the first position by the snib.

The components of the lock will generally be assembled inside a lock body. The body may incorporate the external furniture of the lock and the handle etc. The size and shape of the furniture and handle may be generally the same as in other sliding door locks and locks for sliding wings. For instance, the furniture may have a vertically elongate main portion that can be mounted on a side of the sliding door near the front edge of the door, and the handle may form a loop with the main portion wherein one end of handle connects to (or near) the top of the main portion and the other end of the handle connects to (or near) the bottom of the main portion. The part of the loop that forms the handle may be any convenient (preferably ergonomic) shape, for example a smooth arc shape of sufficient thickness to be comfortably gripped by hand. The part of the loop that forms the handle will generally extend away from the front edge of the lock so that when the lock is installed on the side of the door, the handle extends away from the front edge of the door.

The furniture and handle of the lock may be substantially symmetrical about the horizontal centre line of the furniture. In this way, if the lock is flipped over to be used as a left-handed lock rather than a right-handed lock (or vice-versa), the shape of the furniture and the handle in the inverted configuration will be a mirror image of its shape in the un-flipped configuration. So, the shape of the furniture and handle may be mirrored, but otherwise consistent in either configuration.

The lock body may also incorporate a housing containing internal components of the lock. The housing may be integral with or part of the main portion of the lock furniture, or it may be separate. In some embodiments the housing may comprise a "cassette" separate from the lock's external furniture. At least some of the lock's internal components may be mounted inside the cassette. The cassette (with the internal components mounted therein) may be mountable securely within the main portion of the furniture when the lock is assembled, for example using screws, rivets etc. The cassette may comprise a hollow casing with an opening (the cassette may be open along one side although other openings are also possible) to allow the internal components to be installed in the cassette. The cassette may have a shape that roughly corresponds with the shape of the main portion of the furniture so that the cassette can be snugly received and secured within the main portion.

As explained above, when the lock is flipped over to be used in the opposite handedness, the lock furniture (including the handle) may be inverted so that the handle points in the opposite direction. Certain embodiments of the invention may incorporate a separate "cassette" containing internal components of the lock, as described above. The cassette may be insertable into, and removable from, the lock furniture. Furthermore, whilst the lock furniture may be inverted when the lock is converted from one handedness to the other, the cassette may remain un-inverted. In other words, the orientation of the lock furniture may be flipped to convert from one handedness to the other, but the orientation of the cassette (and the lock components contained therein) relative to the door when the lock is installed remains the same for either handedness. To facilitate this, the lock furniture may be adapted to receive the cassette in two different configurations relative to

the furniture, one configuration for each handedness. Hence, if the lock is originally configured as a right-handed lock but it is required to be installed on the left-handed side of a door, the cassette can be removed from the furniture and then reinserted back into the furniture in the opposite configuration. This may convert the lock from right-handed to
5 left-handed allowing the lock to be installed on the left-hand side of the door. In this way, the orientation of the cassette relative to the door may remain the same for each handedness of the lock, even though the orientation of the furniture may change for each handedness.

10 The lock of the present invention has a lock tongue which is movable between a locking position and an unlocking position. When the lock is installed on a door and the door is closed (i.e. slid so that the front edge of the door engages with the doorframe), moving the lock tongue into the locking position will cause the lock tongue to engage with a strike or keeper in or associated with the doorframe, thereby securing the door to the
15 doorframe. Conversely, moving the lock tongue into the unlocking position will disengage the lock from the strike or keeper, allowing the door to slide open.

Locks for sliding doors and other sliding wings generally utilise rotating lock tongues rather than the linearly reciprocating lock tongues. Linearly reciprocating lock tongues
20 are more commonly found in locks used on swinging doors and the like. Therefore, it is envisaged that locks in accordance with the present invention will at least usually operate with rotating lock tongues, although no strict limitation is meant in this regard. Suitably, where a rotating lock tongue is used, the rotating lock tongue may comprise a hook shaped "parrot beak" similar to those used on existing sliding door locks. However, no
25 particular limitation is meant in relation to the shape of the rotating lock tongue, and other shapes may also be possible. If a parrot beak shaped lock tongue is used, the locking position will be where the hooked end of the beak is rotated to engage with a strike or keeper in or associated with the doorframe, and the unlocking position will be where the hooked end is rotated out of engagement with the strike or keeper. The parrot
30 beak may be pivotally mounted to the lock body. If the lock has a cassette that is insertable into the body, the parrot beak may be pivotally mounted to the cassette.

The lock of the present invention has a snib. The snib may comprise a single unitary component, or a series of interconnecting or interoperating components that together form a snib mechanism. In either case, the snib may incorporate a lever, tab, button or
5 some other member (hereinafter referred to as the "external snib member") that the user can manipulate by hand from externally of the lock. The snib will be operatively associated with an operating component of the lock (described further below) so that the lock tongue can be moved between the locking position and the unlocking position by moving the external snib member. The exception to this is when the lock is deadlocked,
10 in which case it will not be possible to move the lock tongue from the locking position to the unlocking position by moving the snib. This is also described further below.

In some embodiments, the external snib member may have, or may connect with, a rigid member (hereinafter referred to as a "snib link") which engages with the operating
15 component of the lock. The snib link may connect to the operating component (for example, with some form of pivotal connection), or may be received or captured by the operating component (for example, received in a space in the operating component), in such a way that movement of the external snib member is transmitted via the snib link to move the lock operating component. In other embodiments, the snib may comprise a
20 series of interoperating components that together form a snib mechanism, and the movement of the external snib member may be transmitted to create movement of the lock operating component via the interoperating components of the snib mechanism.

So, movement of the external snib member can cause movement of the lock operating
25 component (except when the lock is deadlocked as described below). The lock operating component is movable between a first position and a second position. The operating component can also engage with the lock tongue so that when the operating component is moved from the first position into the second position, this causes the lock tongue to move from the unlocking position to the locking position.

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In envisaged embodiments, the lock operating component may slide linearly within the lock between the first position and the second position. Suitably, it may slide up and down within the lock between the two positions. The lock tongue will also preferably be in the form of a rotating parrot beak. Therefore, the lock operating component may engage with the parrot beak in such a way that the linear movement of the operating component between the first and second positions causes rotation of the parrot beak between the unlocking and locking positions respectively. One way that this may be achieved is for the operating component to engage with the parrot beak at a point on the parrot beak that is offset from the parrot beak's axis of rotation. To facilitate this, a small protrusion (for example a lug or similar feature) may be provided on one of the operating component and the parrot beak, and a small recess that receives the protrusion, or one or more edges or ridges that can engage with the protrusion, may be provided on the other of the parrot beak and the operating component. Other forms of engagement between the operating component and the parrot beak may also be used, all of which fall within the scope of the present invention.

For the purposes of explanation, consider the arrangement (which may be used in some envisaged embodiments) where a small lug is provided on the parrot beak at a position offset from the parrot beak's axis of rotation, and the lug can be engaged by one or more edges or ridges (preferably a pair of opposed edges) on or associated with the operating component. Hence, when the operating component slides up and down within the lock, the edges of the operating component push on the lug causing the lug to move in roughly the same direction as the operating component. In saying that the lug moves in "roughly" the same direction as the operating component, it will be appreciated that the parrot beak is pivotally connected to the lock body (or the cassette), and the lug will generally be fixed on or to the rotating parrot beak. Therefore, in these embodiments, the lug on the parrot beak is confined to move only in an arcuate path about the parrot beak's axis of rotation. Nevertheless, if the operating component slides, say, upwards, an edge of the operating component may engage with the lug and push the lug upwardly along the arcuate path about the parrot beak's axis of rotation. Because the lug is fixed to the parrot beak at a position offset from the parrot beak's axis of rotation, this movement of the lug

will cause the parrot beak to pivot about its axis of rotation. When the operating component moves in the other direction (i.e. down), another edge of the operating component may engage with the lug to push the lug downwardly, causing the parrot beak to rotate in the other direction.

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In some particular embodiments, a pair of parrot beaks may be provided in the lock. The parrot beaks may be configured to rotate simultaneously. The simultaneously rotating parrot beaks may rotate in the same direction. However, more preferably, the parrot beaks may rotate simultaneously, but in opposite directions. The hooked ends of the parrot beaks may rotate towards each other as the beaks move toward the locking position and away from each other as they move toward the unlocking position, or they may rotate away from each other as they lock and towards each other as they unlock. In either case, the opposing configuration of the parrot beaks may provide increased security compared with locks that use only a single parrot beak. For instance, providing a pair of opposing parrot beaks may help to prevent the door from simply being lifted to disengage the lock from the strike as described in the background section above. This is because, with two opposed parrot beaks, lifting the door may tend to disengage one of the beaks but would serve to increase the force of engagement between the strike and the other beak. The strike or keeper in the doorframe may be configured to receive the oppositely rotating parrot beaks. The configuration of the strike or keeper will be different depending on whether the parrot beaks rotate towards or away from each other. Nevertheless, appropriate configurations for the strike or keeper will be apparent to those skilled in the art and the strike requires no further explanation.

25 Where a pair of oppositely rotating parrot beaks are provided, the operating component in the lock may engage with only one of the parrot beaks, and a separate mechanism may be provided so that the other beak rotates simultaneously as the operating component moves the first mention beak. Alternatively, the operating component in the lock may engage with both parrot beaks in such a way that the linear movement of the operating component (i.e. movement in one direction) causes each beak to rotate between its unlocking and locking position. In other words, movement of the operating component in

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one direction may cause one beak to rotate one way and the other beak to rotate the other way.

The operating component may engage with each parrot beak using a similar arrangement to that described above. Hence, each parrot beak may have a lug fixed at a position offset from the parrot beak's axis of rotation, and for the lug on each parrot beak, the operating component may have a pair of edges or ridges which may drive each respective lug up and down as the operating component slides up and down within the lock. So that the movement of the operating component in one direction causes one beak to rotate one way and the other beak to rotate the other way, the lug on one of the beaks should be offset to one side of the axis of rotation, and the lug on the other beak should be offset to the other side. For example, if one of the beaks has a lug which is offset to the right of its axis of rotation when viewed in a particular orientation, the lug on the other beak should be offset to the left of that other beak's axis when viewed in the same orientation. It will be appreciated that the axes of rotation of the respective beaks will generally be parallel so that the plane defined by the rotation of each beak (which is perpendicular to the beak's rotational axis in each case) is the same as, or parallel to, the plane of the other beak's rotation. If one beak has the lug offset to the right, and the other beak has the lug offset to the left, then when the operating component is moved upwards, the beak with the lug on the right will be driven in a counterclockwise direction, and the beak with the lug on the left will be driven in a clockwise direction.

The operating component may comprise a single unitary component, although other embodiments are also possible where the operating component incorporates a number of interconnecting or interoperating parts. Where the operating component comprises a single unitary component, the component may comprise a substantially rigid member extending between the parrot beaks, and possibly between other internal parts of the lock as well. Suitably, the operating component may be plate-like in configuration. The plate-like operating component may be shaped to have edges, ridges, openings, indents, protrusions etc to allow the operating component to engage with other internal components of the lock. For instance, features on the perimeter of the component may

define the above-mentioned edges which engage with the lug(s) on the parrot beak(s). Similarly, the component may incorporate openings or slots to allow the snib link (or some other part of the snib or snib mechanism) to engage with the operating component. Further features of the operating component described further below.

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The lock of the present invention incorporates a drive component that can engage with the operating component. The drive component is movable between a lock opening position, a lock closing position and a deadlocking position. When the drive component is moved into the lock opening position, this causes the operating component to adopt the first position which in turn causes the lock tongue(s) to adopt the unlocking position. Similarly, when the drive component is moved into the lock closing position, this causes the operating component to adopt the second position making the lock tongue(s) adopt the locking position. Hence, moving the drive component between the lock opening position and the lock closing position can move the lock operating component between the first position and second position, just as the snib can (see above). In other words, the snib and the drive component can both be used to unlock and lock the lock tongue by moving the operating component between the first and second positions. However, as mentioned above, the exception to this is when the lock is deadlocked, and this occurs when the drive component is moved into the deadlocking position. Moving the drive component into the deadlocking position causes the operating component to be held in the second position so that the operating component cannot be moved from the second position to the first position by the snib.

In many embodiments of the invention, the drive component may comprise a rotating component. Hence, in these embodiments the rotating drive component will rotate between the lock opening position, the lock closing position and the deadlocking position. Suitably, the lock closing position may be between the lock opening position and a deadlocking position such that the rotating component adopts or passes through the lock closing position as it rotates from the opening position to the deadlocking position (and vice versa). Preferably, the rotating component may be confined to rotate less than

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360°, meaning that it is rotatable between two extremes of rotation. The lock opening position may be at one extreme and the deadlocking position may be at the other extreme.

5 The rotating component may have a cam for engaging with the lock operating component. The cam may comprise a protruding portion of the rotating component. The cam may be positioned generally on one side of the rotating drive component when the drive component is assembled in the lock. This is so that, when the drive component is rotated in one direction, the cam moves upwards even though it is constrained to rotate about the drive component's axis of rotation. In other words, the positioning of the cam
10 on the side of the drive component may allow the cam to move in an upwardly arcing path when the drive component is rotated one way. Similarly, when the drive component is rotated the other way, the cam may move downward (in a downwardly arcing path). The operating component may have one or more ridges or edges for engaging with the cam. Suitably, the operating component may have a pair of such edges, one for engaging
15 the cam from above and the other for engaging the cam from below. Hence, rotation of the rotating drive component in one direction may cause the cam to push down on one of the edges of the operating component, forcing the operating component to slide downwards in the lock. Rotation of the rotating drive component in the other direction may cause the cam to push up on the other edge of the operating component, forcing the
20 operating component to slide upwards in the lock.

The operating component may be slid downwards to adopt the first position (to unlock the lock tongue(s)), and upwards to adopt the second position (to lock the lock tongue(s)), or vice versa. The direction that the rotating drive component will need to be rotated to
25 drive the operating component up and down will depend on whether the cam is on the left-hand side or the right-hand side of the drive component. For the purposes of explanation, consider a configuration where the operating component is slid downwards to adopt the first position (to unlock the lock tongue(s)), and upwards to adopt the second position (to lock the lock tongue(s)). Hence, rotating the drive component from the lock
30 opening position to the lock closing position will drive the operating component upwards from the first position to the second position. When the operating component reaches the

second position, the lock tongue(s) may be locked and the operating component may not slide upwards in the lock any further. However, the drive component may be capable of further rotation (i.e. rotation from the lock closing position into the deadlocking position). Throughout this further rotation, the cam of the drive component may remain engaged
5 with the operating component.

When the drive component is rotated from the lock closing position to the deadlocking position, the cam on the drive component may become positioned directly in line with (typically directly above) the drive component's point (i.e. axis) of rotation. When the
10 cam reaches this position, the drive component may resist any attempt to unlock the lock. This is because any attempt to unlock the lock would need to cause the operating component to slide downwards towards the first position (to unlock the lock tongue(s)). Hence, any attempt to unlock the lock (for example using the snib or by making an unauthorised attempt to force the lock) would cause the operating component to impart a
15 downward force on the drive component's cam. However, because the cam is positioned directly in line with (above) the drive component's axis of rotation when in the deadlocked position, the line of action of the force would pass directly through the drive component's axis of rotation. Consequently, the force would have no directional component which would tend to rotate the cam back towards the lock closing or lock
20 opening positions. Therefore, in order to be able to unlock the lock using the snib, the drive component itself must first be rotated back to the lock closing position (or at least back out of the deadlocking position) whereupon downward forces imparted on the lock operating component by the snib would tend to urge the cam to move in its arcing path around the drive component's axis of rotation.

25 The drive component will preferably be operable from externally of the lock. However, the means for operating the drive component from externally of the lock should provide a suitable level of security. Therefore, it is envisaged that the drive component will generally be operable by a key cylinder such that the drive component can only be
30 operated by inserting and turning the correct key. Whilst most embodiments of the invention will operate using a key cylinder, no strict limitation is meant in this regard and

other secure operating means are possible. For example, the lock could be provided with an internal electric motor for rotating the drive component, and the electric motor could be operable from externally of the lock by way of a remote control or the like. Other secure operating means known to those skilled in the art may also be used.

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- The drive component may be centrally located within the lock mechanism. Suitably, the drive component may be centrally located within the cassette. The key cylinder may be received in an aperture in the lock furniture. The aperture in the lock furniture which receives the key cylinder (and hence the key cylinder itself) may also be centrally located
- 10 so that the key cylinder barrel lines up with the drive component even when the furniture is flipped relative to the cassette to change the lock from one handedness to the other. Suitably, the key cylinder's axis of rotation may be coaxial with the drive component's axis of rotation. The end of the key cylinder barrel inside the lock may connect directly, or indirectly via linking component(s), to the drive component such that rotation of the
- 15 key barrel causes direct rotation of the drive component. However, those skilled in the art will appreciate that the barrel could alternatively be located in some other non-central location and an additional mechanism could be provided such that rotation of the barrel is transmitted through the mechanism to cause rotation of the drive component.
- 20 Providing the drive component and the key cylinder barrel in the centrally located positions described above may have the benefit that the key cylinder will be located in the same place (relative to the cassette) irrespective of whether the lock is installed in a left-handed or right-handed configuration. The design of the lock may enable the key cylinder to be removed, inverted and reinserted into the lock when converting the lock
- 25 from one handedness to the other. Hence, if the lock is originally configured as a left-handed lock but it is required to be flipped over to be installed as a right-handed lock, the key cylinder can be removed from the lock and reinserted with the key cylinder in the opposite orientation (typically, but not necessarily, the key cylinder will be oriented such that the slot which receives the key points down in either handedness as described
- 30 below). The ability to remove the key cylinder may also enable the key cylinder to be replaced with another key cylinder to "re key" the lock.

The lock will preferably be configured so that the key can be turned in conventional directions (i.e. a conventional direction to lock the lock and a conventional opposite direction to unlock the lock) irrespective of which handedness the lock is in. Preferably, 5 whichever handedness the lock is in, the conventional directions may be such that the top edge of the key is rotated towards the front edge of the door to lock the lock, and away from the front edge of the door to unlock the lock. The central location of the key cylinder and the drive component, and the ability to remove, invert and reinsert the key cylinder, may help facilitate the conventional key turning directions in either handedness 10 of the lock. Preferably, the drive component may be configured so that the key cylinder barrel can engage with the drive component from either side. Therefore, when the lock is in a left-handed configuration the key cylinder may extend through an aperture in one side of the cassette to engage with the drive component from that side, and conversely when the lock is in a right-handed configuration (wherein the cassette may be inserted in 15 the opposite configuration relative to the furniture) the key cylinder may extend through an aperture in the other side of the cassette for the barrel to engage with the other side of the drive component. However, because the orientation of the drive component (and indeed the entire cassette) remains the same in either handedness, the respective directions that the drive component rotates to lock and unlock the lock remain the same 20 for either configuration. By way of explanation, consider the situation where the drive component rotates counterclockwise to lock the lock when viewed from one side of the lock. This same locking rotation would appear as clockwise rotation when viewed from the other side of the lock. With this in mind, it will be appreciated that in order to lock the lock when the lock is in one handedness, it will be necessary to turn the barrel one 25 way (say counterclockwise from the user's point of view). However, when the lock is in the other handedness, the barrel will engage with the drive component from the other side and it will therefore be necessary to rotate the key the other way (clockwise from the point of view of the user on the other side of the door). As explained above, in both handednesses of the lock, the key cylinder may be inserted such that when the barrel is in 30 the orientation in which a key can be inserted into the slot, the key slot points down. Also, when a key is inserted into the key barrel the top edge of the key will preferably

rotate towards the front edge of the door to lock the lock, and away from the front edge of the door to unlock the lock. This would mean rotating the key clockwise to lock the lock in one handedness, and counterclockwise to lock the lock in the other handedness, but in each case this would cause the same locking rotation of the drive component.

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The engagement between the key cylinder barrel and the drive component may allow an increased extent of lost motion compared with existing configurations. There will preferably be over 180° of lost motion, and even more preferably over 300° of lost motion. One way of achieving an increased extent of lost motion may be to provide an entraining member on the internal end of the key cylinder barrel that can engage with features on the drive component in a particular way. The entraining member may protrude from the end of the key cylinder barrel, and it may have a generally elongate shape extending part way across the diameter of the barrel's end. One end of the elongate entraining member may be slightly wider than the remainder of the entraining member and partially wedge shaped (like a piece of pie). The other end of the elongate entraining member may have an entraining lug which protrudes out from the end of the barrel even further than the other parts of the entraining member. The drive component may incorporate a cylindrical portion towards the centre thereof, and the cylindrical portion may have generally round through-bore extending all the way through forming a bore through the centre of the drive component. The cylindrical portion may have a small wedge-like tab extending from a point on the circumference of the cylindrical portion. To enable the key cylinder barrel to engage with the drive component from either side, there may be a small wedge-like tab on either end of the cylindrical portion (i.e. a tab on either side of the drive component). The through bore may have a raised ridge extending along the length of the inside wall of the bore. The ridge may be located diametrically across from the wedge-like tabs.

When the key cylinder barrel is brought into engagement with the drive component (on one side or other of the drive component depending on the handedness of the lock), the entraining lug on one end of the barrel's entraining member may insert into the through-bore in the drive component. At the same time, the wedge-like tab on the circumference

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of the drive component's cylindrical portion may become positioned beside the barrel's protruding entraining member. Consequently, rotating the barrel in one direction will cause the wider wedge shaped end of the entraining member to contact with the wedge-like tab on the drive component (the sloping sides of the wedge shaped end of the entraining member may have a similar slope to the sloping sides of the wedge-like tab so as to allow close mating contact between the two), and at the same time the entraining lug may contact with the ridge inside the drive component's through bore. This may then cause the drive component to rotate in the same direction as the barrel. However, rotating the barrel back the other way may cause the wide end of the entraining member and the entraining lug to separate from the wedge-like tab and the ridge respectively. It may then be possible to rotate the barrel all the way around until the wedge-shaped wide end of the entraining member contacts with the other side of the wedge-like tab on the drive component and the entraining lug contacts with the other side of the ridge. It is envisaged that this arrangement may facilitate approximately 315° of lost motion, although the exact amount of lost motion may be varied to suit. Also, because the wedge-like tab and the ridge in the through-bore diametrically opposed on the cylindrical portion of that drive component, this arrangement does not result in unbalanced forces being imparted from the barrel into the drive component. The ability to provide this increased extent of lost motion may be particularly useful in allowing the barrel to engage with the drive component from either side of the cassette.

The lock may incorporate means for providing an indication to the user when the drive component reaches one or more (or each) of the respective lock opening, lock closing and deadlocking positions. A number of ways of providing such an indication are possible. For example, some embodiments may provide an audible "click" or other sound when the drive component reaches a particular position (for example, to indicate that the lock has adopted one of the opened, locked or deadlocked modes). Other embodiments may utilise visual indicators (such as a window in the lock body that shows green, yellow and red for the lock opening, lock closing and deadlocking positions of the drive component respectively). However, embodiments of the invention may more commonly utilise a mechanism that allows the user to physically feel when the drive component reaches one

or other of the lock opening, lock closing or deadlocking positions. In certain envisaged embodiments, a spring and roller arrangement may be used. The spring may be a linear spring (such as a coil spring or a compressible rubber member etc). One end of the spring may be mounted to the lock body (or the cassette), and the roller may be positioned for rotation on the other end of the spring. Suitably, the roller may comprise a ball bearing. The ball bearing may engage with the outer surface of the drive component. Hence, rotation of the drive component may cause the ball bearing to roll along the drive component's outer surface. The outer surface of the drive component may be provided with one or more indents. Preferably, an indent may be provided for each of the lock opening, lock closing and deadlocking positions of the drive component. Hence, as the drive component moves into one of these positions, the ball bearing may be forced into the indents under the force of the spring. The insertion of the ball bearing into the indent may provide a slight resistance to the further rotation of the drive component which will be felt by the user as they operate the key or the snib. The resistance to further rotation provided in this way may be easily overcome by the user. So the user can continue to turn the drive component which results in the ball bearing being forced back out of the indent and continue rolling along the outer surface of the drive component. Nevertheless, the insertion of the ball bearing may provide a physically felt indication when the drive component is in one of the said positions.

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The lock may also be provided with an "anti-slam" mechanism. An anti-slam mechanism is a mechanism that retains the lock tongue(s) in the unlocking position until the door is fully closed with the lock in engagement (or at least very close proximity) with the strike or keeper. This prevents the lock tongue(s) from being moved into the locking position before the door is closed, and therefore helps alleviate the risk of the door being slammed into the keeper with the lock tongue(s) already in the locking position causing damage to the lock and/or keeper. Therefore, the anti-slam mechanism operates to prevent the snib or the key cylinder from being used to move the lock tongue(s) into the locking position until the door is fully closed. After the door is properly closed, the snib and/or the key can be used to operate the lock as described above. A variety of anti-slam mechanisms

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have previously been used on locks for sliding doors and other sliding wings, and any such mechanism may be used with the present invention.

5 The lock may be provided with a deadlock indicator. This could be in addition to the above-mentioned means for providing a positive indication to the user when the drive component reaches one or more (or each) of the respective positions. The deadlocked indicator may provide a visual indication to the user when the lock is deadlocked. This is so that the user can identify at a glance that the lock is deadlocked. This may be particularly useful in the case of fire or some other emergency when it is necessary to
10 operate the lock very quickly. By providing a visual indication as to whether or not the lock is deadlocked, the user can determine at a glance the action required to unlock the lock without needing to fiddle with the lock to first determine which mode the lock is in. The deadlocked indicator could take a wide variety of forms. For example, the window in the lock body mentioned above that shows green, yellow and red for each of the
15 respective drive component positions would function as a deadlocked indicator. The deadlock indicator may operate to provide a positive indication to the user when the lock is deadlocked, whichever handedness the lock is in.

In envisaged embodiments, the deadlocked indicator may comprise a tab which extends
20 visibly out from the lock body when the lock is deadlocked, but which is retracted into the lock body out of sight when the lock is not deadlocked (i.e. the tab is retracted at all times when the lock is operable by the snib). The deadlock indicator mechanism may incorporate an elongate component inside the lock. The elongate component may be biased towards the retracted position so that the tab (which may connect with the elongate
25 component) only extends out of the lock furniture when it is driven out by deadlocking the lock, and so that the tab immediately retreats back inside the lock body when the lock is un-deadlocked. The elongate component may be configured to slide up and down within the lock. Preferably, the elongate component may be mounted in the cassette and it may slide up and down within the cassette. Providing the elongate component in the
30 cassette may provide the benefit that the orientation of the elongate component relative to the door when installed on the door remains the same for either handedness of the lock,

thus making the deadlocking indicator "non-handed" and allowing it to function in either handedness. The elongate component may engage with the cam on the drive component when drive component rotates into the deadlocking position. Hence, rotating the drive component into the deadlocking position may drive the elongate component up (or down) in the lock forcing the tab to project out from the lock furniture. The lock furniture may be provided with an aperture through which the tab can extend when the lock is deadlocked. Preferably, the furniture may have a pair of apertures (typically one in either end) to allow the tab to extend out, whichever handedness the lock is in.

- 10 In another form, the invention resides in a lock for a sliding wing comprising
- a parrot beak rotatable between a locking position and an unlocking position to lock and unlock the wing respectively,
 - a rigid operating component which is slidable in a linear fashion between a first position and a second position and which can engage with the parrot beak at a point on the parrot beak offset from the parrot beak's axis of rotation such that sliding the operating component into the first position causes the parrot beak to rotate into the unlocking position and sliding the operating component into the second position causes the parrot beak to rotate into the locking position, and
 - a key operated drive component that can engage with the operating component and which is moveable between an opening position and a deadlocking position,
- wherein moving the drive component into the opening position causes the operating component to adopt the first position and moving the drive component into the deadlocking position causes the operating component to adopt the second position.

- 25 In a further broad form, the invention resides in a lock that can be converted from one handedness to the other handedness, the lock comprising lock furniture that can be inverted when converting the lock from one handedness into the other, a casing within which internal components of the lock can be mounted, the casing being mountable to the furniture but also removable and re-mountable to the furniture in an inverted orientation whereby when the lock is installed the orientation of the casing can be the same whichever handedness the lock is installed in, and a key cylinder mountable to the

furniture but which can be removed, inverted and re-mounted to the furniture wherein the key cylinder can engage the components inside the casing from either side of the casing and the lock can be operated by turning a key in conventional directions whichever handedness the lock is installed in.

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In yet a further broad form, the invention resides in a lock having a lock tongue movable between a locking position and an unlocking position, a drive component in the lock that can be rotated to cause the lock tongue to move between the locking position and the unlocking position, and a key cylinder for rotating the drive component, the key cylinder
10 being configurable to engage with the drive component from either side of the drive component, wherein the engagement between the key cylinder and the drive component allows over 180° of lost motion of the key cylinder whichever side of the drive component the key cylinder engages from.

15 It will be appreciated that features described with reference to one broad form of the invention may also form part of any of the other broad forms of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

One embodiment of the invention is described below with reference to the drawings.
20 However, it will be clearly appreciated that this embodiment is described for the purposes of illustration only and the invention is not necessarily limited to or by the particular features described. In the drawings:

Figure 1 is an exploded perspective illustration of the cassette along with a number of the
25 internal parts of the lock mechanism;

Figure 2 is a perspective illustration of the assembled lock and lock furniture in a right-handed configuration;

30 Figure 3 is a partially exploded perspective illustration of the lock and some of its components;

Figure 4 shows the lock mechanism when the lock is unlocked;

Figure 5 shows the lock mechanism when the lock is locked;

Figure 6 shows the lock mechanism when the lock is deadlocked;

Figure 7 shows the tab and the top part of the deadlock indicator; separate from each other,

Figure 8 shows the tab and the deadlock indicator of Figure 7 connected together;

Figure 9 shows an alternative configuration of the tab and the top part of the deadlock indicator, separate from each other;

Figure 10 shows the tab and the deadlock indicator of Figure 9 connected together; and

Figure 11 is a close-up perspective illustration of the internal end of the key barrel and the drive member.

DETAILED DESCRIPTION OF THE DRAWINGS

Figure 1 shows a cassette 10 having a cover 11. The cassette 10 provides a hollow casing inside which the other components shown in Figure 1 can be mounted. When the components are assembled and mounted within the cassette 10, the cover 11 can be secured over the open side of the cassette using screws, rivets etc to close the cassette. The cassette 10 with all of the components assembled inside is shown in Figure 3 (with the cover 11 removed for clarity).

Figure 2 shows the external furniture of the lock in a right-handed configuration. The furniture incorporates an elongate box-like main body portion (the "body") 30, and a handle 32 extending in an arc shape from the top to the bottom of the body 30. Because

the furniture in Figure 2 is shown in a right-hand configuration, the handle 32 extends out to the right of the body so that when the lock is installed on a right-handed door, the front edge of the furniture 30' (hidden on the left in Figure 2) will line up approximately flush with the front edge of the door. It will be noted however that the body 30 and the handle 32 are symmetrical about the horizontal centre line A-A in Figure 2. Consequently, if the lock furniture were to be flipped over to be used as a left-handed lock (i.e. with the handle 32 extending out to the left) rather than as a right-handed lock as shown, the shape of the furniture and the handle in the inverted configuration would be a mirror image of the shape shown in Figure 2. If the lock is flipped over, it is also possible to remove the key cylinder 36, invert it, and reinsert it. This way, the key cylinder can be oriented "key slot down" as shown in Figure 2, irrespective of which configuration the lock is installed in. Swapping the key cylinder around is discussed further below.

Figure 3 demonstrates the way the casing 10, with the internal components of the lock mounted therein, can be inserted into the main portion 30 of the body. This is indicated by the dashed lines. It will also be appreciated that the cassette 10 can be readily removed from the main portion 30 of the body. When converting the lock from one handedness to the other, the casing may be removed and inverted (i.e. rotated 180° as indicated by the arrows "B") and then reinserted. In this way, the orientation of the cassette relative to the door when the lock is installed remains the same, even though the orientation of the furniture is flipped to swap the handedness of the lock. The opening in the main portion of the body of 30 where the casing 10 is inserted should therefore be shaped to receive the cassette 10 in either of these configurations. The opening for receiving the cassette is not shown in the drawings.

Figure 3 also illustrates a snib link member 17 and an external snib button 17a, as well as illustrating key cylinder 36 more clearly. As explained above, the key cylinder 36 can be removed, inverted and reinserted so that the key cylinder is oriented "key slot down" in both the left-handed and the right-handed configuration of the lock. To facilitate this, the circular aperture 302 in the body 30 which receives the key cylinder 36 has two box-shaped gaps, one extending above aperture 302 and one extending below it. The lower

gap 303 can just be made out in Figure 3. The purpose of the gaps is to receive the box shaped portion 362 of the key cylinder which contains the key cylinder's split pins. Hence, when the lock is installed in one configuration the key cylinder split pin box 362 will be received in one of the gaps, and when the lock is installed on the other configuration the split pin box 362 will be received in the other gap. Retaining screw 361 is used for securing the key cylinder 36 in the body 30.

From Figure 3, it can also be seen that the snib link member 17 has a pair of small tabs 171 which extend through the aperture 301 in the body 30 when the lock is assembled. The snib button 17a attaches to the link member 17 using the tabs 171 to become mounted as shown in Figure 2. The snib button 17a can then be manipulated by hand from externally of the lock to operate the snib as described further below. The snib link member 17 also has a pair of link arms 172. The operation of the link arms 172 will also be described further below.

In Figure 1, the illustrated internal components of the lock include an operating plate 12, an upper parrot beak 14, a lower parrot beak 16, a drive member 18, a locking ring 19, a deadlock indicator arm 20, an anti-slam tongue 22, an anti-slam spring 23, a ball bearing 24 and a feedback spring 25. Figures 4, 5 and 6 show these components assembled together.

Figure 4 shows the lock in the unlocked configuration. In this configuration, the parrot beaks are rotated into their unlocking position. In other words, the parrot beaks are rotated back into the cassette 10 (and therefore into the body 30, although the body is not shown in Figures 4-6). To rotate the parrot beaks into the unlocking position, the operating plate 12 is slid downwards into the first position as shown in Figure 4. Sliding the operating plate down into the first position rotates the beaks into the unlocking position because the operating plate 12 is provided with a pair of ridges 121 and 122 (also shown in Figure 1) that push down on the small knobs 141 and 161 on the upper and lower beaks respectively. It will be noted from Figure 1 that the knob 141 on upper beak 14 is located on the left-hand side of that beak's axis of rotation. In contrast, the knob

161 on lower beak 16 is located on the right-hand side of that beak's axis of rotation. Consequently, sliding the operating plate 12 downwards (i.e. in one direction) causes upper beak 14 to rotate counterclockwise and lower beaks 16 to rotate clockwise into the unlocking position shown in Figure 4.

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Figure 5 shows the lock in the locked configuration. In this configuration, the parrot beaks are in the locking position where they are rotated out to enable them to engage with a strike or keeper in or associated with the doorframe (not shown). To rotate the parrot beaks into the locking position, the operating plate 12 is slid upwards into the second position as shown in Figure 5. Sliding the operating plate up into the second position rotates the beaks into the locking position because the operating plate 12 is provided with a pair of ridges 123 and 124 that push up on the small knobs 161 and 141 respectively. Therefore, because knob 141 is located on the left-hand side of the upper beak's axis of rotation and knob 161 is located on the right-hand side of the lower beak's axis of rotation, sliding the operating plate 12 upwards causes upper beak 14 to rotate clockwise and lower beak 16 to rotate counterclockwise into the locking position shown in Figure 5.

The upwards and downward sliding of the operating plate shown in Figures 4 and 5 can be achieved by way of either the snib or the drive member. Referring to the snib first, it will be seen from Figures 1, 4-6 that operating plate 12 has a pair of apertures 125 on its right-hand edge. When the lock is assembled, the link arms 172 of the snib link 17 insert into apertures 125. Therefore, operating plate 12 can be moved up and down within the lock between the first position (Figure 4) and the second position (Figure 5) by sliding snib button 17a up and down from externally of the lock.

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Figures 1, 4-6 also show that the lock incorporates a drive member 18 mounted in the centre of the lock mechanism, and secured in position by locking ring 19. The drive member 18 is a circular rotating component with a protruding cam 181 extending from a portion of its perimeter and edge. The operating plate 12 has a pair of ridges 126 and 127 which engage on either side of the cam 181 when the lock is assembled. Lower ridge 126 engages the cam 181 from below and upper ridge 127 engages the cam 181 from above.

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The drive member 18 is coaxial with and connects to the barrel of key cylinder 36 (as described further below with reference to Figure 11), and so the drive member 18 can be rotated directly by rotating the key cylinder barrel. Referring to Figure 4, it can be seen that the drive member 18 has been rotated clockwise. This causes the cam 181 to push
 5 downwardly on ridge 126, thereby forcing operating plate 12 down into the first position. The position of the drive member 18 in Figure 4 is the lock opening position. Conversely, in Figure 5, drive member 18 has been rotated counterclockwise causing cam 181 to push upwardly on ridge 127 forcing the operating plate 12 upwards into the second position. The position of the drive member 18 in Figure 5 is the lock closing position.

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Figure 6 shows the lock in the deadlocked configuration. In this configuration, the drive member 18 has been rotated counterclockwise past the lock closing position into the deadlocking position. It can be seen that, this further rotation of the drive member does not push the operating plate 12 any further up in the lock. However, it causes the cam
 15 181 of the drive member 18 to be positioned directly above the drive member's axis of rotation. When the cam 181 reaches this position, the drive member 18 resists any attempt to unlock the lock otherwise than by the key cylinder. This is because any attempt to unlock the lock (except by the key cylinder) would need to slide the operating plate 12 downwards towards the first position to thereby unlock the parrot beaks. Hence,
 20 any attempt to unlock the lock (for example using the snib 17a or by making an unauthorised attempt to force the parrot beaks, for example using a jimmy) would cause the operating plate 12 to impart a downward vertical force on the cam 181. However, because the cam 181 is positioned directly above the drive member's axis of rotation, the line of action of the vertical force passes directly through the drive component's axis of
 25 rotation. Consequently, the force has no directional component that would cause the cam to rotate back towards the lock closing or lock opening positions. Also, when the operating plate 12 is in the second position shown in Figures 5 and 6, the knob 161 on the lower beak 16 engages with ridge 129. Similarly, knob 141 on upper beak 14 engages with ridge 130 (only visible in Figure 1). Hence, any attempt to force the parrot beaks
 30 when the beaks are in the locking position is also resisted by the engagement of the knobs 141 and 161 with the ridges 130 and 129 respectively. Therefore, in order to be able to

unlock the lock using the snib 17a, the drive member 18 must first be rotated back to the lock closing position using the key cylinder 36. Once the cam 181 is rotated back into the lock closing position, any downward forces imparted on the operating plate 12 by the snib links 172 would in turn urge the cam 181 to move down in its arcing path around the drive component's axis of rotation, allowing the operating plate 12 to slide down into the first position to unlock the lock. This would then move the parrot beaks as normal.

As mentioned above, the lock also incorporates a deadlock indicator arm 20. The indicator arm 20 has a slightly flexible "wavy" portion 21 which engages with one of the mounting columns 101 in the cassette. This tends to push the indicator arm 20 downwards within the lock, biasing the deadlock indicator 20 to the retracted position shown in Figures 4 and 5. However, when the drive member 18 is rotated into the deadlocking position shown in Figure 6, the cam 181 of the drive member engages against the bottom of the indicator 20 pushing it upwards in the lock. This in turn causes the top of the indicator (or the tab mounted thereon-see Figures 7-10) to project out of the top of the lock providing a visual indication that the lock is deadlocked. The opening in the lock furniture 33 through which the indicator projects is visible in Figure 2. There may also be another opening (not shown) in the other end to allow the top of the indicator to stick out when the lock is configured in the other handedness. When the indicator 20 is pushed upwards so that the top projects visibly out of the lock, this compresses the wavy portion 21. However, as soon as the cam 181 is rotated back out of the deadlocking position towards the lock closing position, the bias created by the compressed wavy portion 21 pushes the indicator 20 back down into the lock retracting the indicator out of sight.

The lock also incorporates an anti-slam mechanism. In the embodiment presently described, the anti-slam mechanism is created by the interaction of anti-slam tongue 22 with the uppermost projection of operating plate 12. Referring to Figure 1, it can be seen that the anti-slam tongue 22 is a generally step shaped component. Figures 4-6 demonstrate that when the anti-slam tongue 22 is mounted in the lock, it is biased towards the extended position by anti-slam spring 23. Referring again to Figure 1, it can

be seen that anti-slam tongue 22 has a small projection 221 extending from its side face. When the sliding door is initially open, the parrot beaks will be in their unlocking position. Therefore, the operating plate 12 is slid down into the first position. When the lock is in this unlocked configuration, the anti-slam tongue 22 extends out from the lock as shown in Figure 4. When the anti-slam tongue 22 extends out as shown, the small projection 221 on the side of the anti-slam tongue engages with the ridge 128 on the top portion of the operating plate 12. The engagement of ridge 128 with the protrusion 221 prevents the operating plate from sliding upwards in the lock, even if an attempt to move the operating plate is made using the snib 17a or the drive member 18. Therefore, while the sliding door is open and the anti-slam tongue is extended, the lock cannot be operated to extend the parrot beaks. However, when the door is closed, the front edge of the door will be brought into engagement with the doorframe, and this will push the anti-slam tongue back into the lock as shown in Figures 5-6. When this happens, the protrusion 221 on the anti-slam tongue is moved back out of engagement with, and out of the path of the top of the operating plate 12. Therefore, when the door is closed and the anti-slam tongue 22 is retracted, the lock can be operated to extend the parrot beaks using the snib or the drive member as described above.

When the user unlocks the lock immediately prior to sliding the door open, the act of unlocking the lock will initially force the operating plate 12 down into the first position. Then, because the operating plate 12 is in the lower first position, the anti-slam tongue 22 is able to project outwardly under the bias of anti-slam spring 23 as the door is withdrawn from the doorframe.

The lock incorporates a mechanism for providing an indication to the user when the drive member 18 reaches the respective lock opening, lock closing and deadlocking positions. The mechanism allows the user to physically feel when the drive component reaches each position. The mechanism operates using ball bearing 24 and feedback spring 25. One end of the feedback spring 25 is mounted to the cassette 10, and the bearing 24 is positioned to rotate on the other end of the spring. The ball bearing 24 engages with the outer surface of the drive member 18. Hence, rotation of the drive member causes the

ball bearing to roll along the drive member's outer surface. The outer surface of the drive member 18 has a series of indents, each located so that as the drive member moves into one of the above-mentioned positions, the ball bearing is forced into the relevant indent under the force of the feedback spring 25. The insertion of the ball bearing into the indent provides a slight resistance to the further rotation of the drive member 18. This will be felt by the user as they operate the key or the snib. However, the resistance is easily overcome by the user so they can continue to turn the drive member 18, and doing so will force the ball bearing back out of the indent to continue rolling along the outer surface of the drive member 18.

The engagement between the key cylinder 36 and the drive member 18 is shown in Figure 11. This arrangement allows an increased extent of lost motion compared with existing configurations. In fact, this configuration allows approximately 315° of lost motion. There is an entraining cap 363 on the internal end of the barrel of key barrel 36 that can engage with features on the drive member 18. More specifically, the entraining cap 363 has a bar 364 protruding from its front circular face. The bar is generally elongate in shape and extends part way across the diameter of the cap 363. One end 365 of the bar is slightly wider than the remainder of the bar and is partially wedge shaped (like a piece of pie). The other end of the bar has lug 366 which protrudes out even further than the rest of the bar. The drive member 18 has a cylindrical portion 182 towards the centre thereof, and the cylindrical portion 182 has a round through-bore 183 extending all the way through forming a bore through the centre of the drive component. The cylindrical portion 182 also has a small wedge-like tab 184 extending from a point on the circumference of the cylindrical portion 182. To enable the barrel of key cylinder 36 to engage with the drive member 18 from either side, there is a tab 184 on either end of cylindrical portion 182 (i.e. a tab on either side of the drive component). Also, the through bore 183 has a raised ridge 185 extending along the length of the inside wall of the bore. The ridge 185 is located diametrically across from the tabs 184.

When the key barrel 36 is brought into engagement with the drive member 18 (on one side or other of the drive member 18 depending on the handedness of the lock), the lug

366 inserts it into the through-bore 183. At the same time, the wedge-like tab 184 on the drive member becomes positioned beside the bar 364 close to the surface of cap 363. Rotating the key barrel in one direction will cause the wide wedge end 365 of the bar to contact with the tab 184 on the drive member. The sloping sides of the wedge end of bar 5 365 have a similar slope to the sloping sides of the wedge-like tab 184 to allow close mating contact between the two. At the same time, the lug 366 contacts with the ridge 185 inside the drive member. These two points of contact cause the drive member 18 to rotate in the same direction as the key barrel 36. However, rotating the key barrel back the other way causes the wide end 365 of the bar and the lug 366 to separate from the tab 10 184 and the ridge 185 respectively. It is then possible to rotate the key barrel 36 all the way back around until the wedge end 365 of the bar contacts with the other side of the tab 184 on the drive member and the lug 366 contacts with the other side of the ridge 185. This free rotation of the key barrel 36 between the two extremes is the "lost motion" of the key barrel, because this free rotation of the key barrel does not cause rotation of the 15 drive member 18. In Figure 11, the cap 363 on the end of the key barrel 36 is shown close to the back side of the drive member (i.e. the opposite side of the drive member to the cam 181). The key barrel can engage with this back side of the drive member, but it can also engage with the front side of the drive member because there is a tab 184 on the front side and the ridge 185 extends all the way through the drive member. This 20 arrangement provides approximately 315° of lost motion and assists in allowing the key barrel to engage and operate from either side of the cassette.

Those skilled in the art will appreciate that various other changes and modifications may be made to the embodiment described without departing from the spirit and scope of the 25 invention.

We Claim:

1. A lock for a sliding wing comprising

- a lock tongue movable between a locking position and an unlocking position to lock and unlock the wing respectively,
- an operating component which can engage with the lock tongue, the operating component being movable between a first position and a second position wherein movement of the operating component into the first position causes the lock tongue to adopt the unlocking position and movement of the operating component into the second position causes the lock tongue to adopt the locking position,
- a snib operatively associated with the operating component such that the operating component can be moved between the first and second positions by moving the snib,
- a drive component that can engage with the operating component and which is movable between a lock opening position, a lock closing position and a deadlocking position,

wherein movement of the drive component into the lock opening position causes the operating component to adopt the first position, movement of the drive component into the lock closing position causes the operating component to adopt the second position, and movement of the drive component into the deadlocking position causes the operating component to be held in the second position so that the operating component cannot be moved from the second position to the first position by the snib.

2. A lock as claimed in claim 1, wherein the lock has a body which incorporates a handle and other external furniture of the lock, the components of the lock are assembled inside the body in use, and the handle and furniture are substantially symmetrical about a horizontal centre line of the furniture.

3. A lock as claimed in claim 2, wherein the lock includes a cassette which is a separate component from the lock's external furniture and at least some of the lock's internal components are mounted inside the cassette.
4. A lock as claimed in claim 3, wherein the cassette is insertable into, and removable from, the lock furniture and the orientation of the lock furniture can be flipped to convert from one handedness to the other, but the orientation of the cassette when the lock is installed can remain the same for both handednesses.
5. A lock as claimed in any one of the preceding claims, wherein the lock tongue comprises a pivoting hook shaped "parrot beak" and the locking position is where the hooked end of the beak is rotated to engage with a strike or keeper in or associated with a surrounding frame, and the unlocking position is where the hooked end is rotated out of engagement with the strike or keeper.
6. A lock as claimed in claim 5, wherein the operating component slides linearly between the first position and the second position, and it engages with the parrot beak in such a way that the linear movement of the operating component between the first and second positions causes rotation of the parrot beak between the unlocking and locking positions respectively.
7. A lock as claimed in claim 6, wherein the operating component engages with the parrot beak at a point on the parrot beak that is offset from the parrot beak's axis of rotation, and the engagement comprises a small protrusion on one of the operating component and the parrot beak, and a small recess that receives the protrusion, or one or more edges or ridges that can engage with the protrusion, on the other of the parrot beak and the operating component.
8. A lock as claimed in any one of claims 5-7, wherein a pair of parrot beaks are provided which rotate simultaneously but in opposite directions.

9. A lock as claimed in claim 8, wherein the operating component engages with the parrot beaks in such a way that the linear movement of the operating component between the first and second positions causes each parrot beak to rotate between its respective unlocking and locking positions.
10. A lock as claimed in any one of claims 8-9, wherein the operating component comprises a substantially rigid plate-like member extending between the parrot beaks and which has edges, ridges, openings, indents or protrusions to allow it to engage with the parrot beaks.
11. A lock as claimed in any one of the preceding claims, wherein the snib incorporates an external snib member that the user can manipulate by hand from externally of the lock, and the snib has, or connects with, a rigid member (hereinafter referred to as the "snib link") which engages with the operating component.
12. A lock as claimed in claim 11, wherein the operating component incorporates openings or slots to allow the snib link to engage with the operating component.
13. A lock as claimed in any one of the preceding claims, wherein the drive component comprises a rotating component which rotates between the lock opening position, the lock closing position and the deadlocking position.
14. A lock as claimed in claim 13, wherein the lock closing position is between the lock opening position and the deadlocking position such that the drive component adopts or passes through the lock closing position as it rotates from the lock opening position to the deadlocking position (and vice versa).
15. A lock as claimed in claim 14, wherein the drive component rotates between two extremes of rotation, and the lock opening position is towards one extreme and a deadlocking position is towards the other extreme.

16. A lock as claimed in any one of claims 13-15, wherein the drive component has a cam for engaging with the operating component, and the operating component has a pair of edges, one for engaging the cam from one side and the other for engaging the cam from the other side, whereby rotation of the drive component in one direction causes of the cam to push one way on the operating component, forcing the operating component to slide in that direction, and rotation of the drive component in the other direction causes the cam to push the other way on the operating component, forcing the operating component to slide the other way.
17. A lock as claimed in claim 16, wherein rotating the drive component from the lock opening position to the lock closing position drives the operating component from the first position to the second position (and vice versa), and rotating the drive component from the lock closing position to the deadlocking position causes the cam on the drive component to become positioned directly in line with the drive component's point of rotation.
18. A lock as claimed in any one of the preceding claims, wherein the lock has a key cylinder and the drive component is a rotating component which is operable from externally of the lock using the key cylinder.
19. A lock as claimed in claim 18, wherein the key cylinder has a key cylinder barrel and an end of the barrel inside the lock connects directly, or indirectly via linking component(s), to the drive component such that rotation of the barrel causes rotation of the drive component.
20. A lock as claimed in claim 18 or 19, wherein the drive component is centrally located within the lock mechanism and the key cylinder's axis of rotation is coaxial with the drive component's axis of rotation.

21. A lock as claimed in any one of claims 18-20, wherein the lock is configured to enable the key barrel to be removed, inverted and reinserted into the lock when converting the lock from one handedness to the other.
22. A lock as claimed in any one of claims 18-21, wherein, whichever handedness the lock is in, the edge of the key which points upwards when the key is inserted into the key cylinder is rotated towards the front edge of the lock to lock the lock, and away from the front edge of the lock to unlock the lock.
23. A lock as claimed in any one of claims 19-22, wherein the connection between the key cylinder barrel and the drive component allows over 300° of lost motion.
24. A lock as claimed in claim 23, wherein an entraining member protrudes from the internal end of the key cylinder barrel, the entraining member having an elongate shape extending part way across the diameter of the barrel's end, one end of the entraining member being wider than the remainder of the entraining member, and the other end of the entraining member having an entraining lug which protrudes from the end of the barrel further than the other parts of the entraining member.
25. A lock as claimed in claim 24, wherein the drive component incorporates a cylindrical portion towards the centre thereof, the cylindrical portion having a round through-bore extending all the way through the centre of the drive component and there being a raised ridge extending along the length of the inside wall of the bore, the cylindrical portion having a tab extending from a point on its circumference, and the ridge being located diametrically across from the tab.
26. A lock as claimed in claim 25, wherein there is a tab on either end of the cylindrical portion (on either side of the drive component), the tabs are wedge-shaped, and the ridge is located diametrically across from the tabs.

27. A lock as claimed in claim 26, wherein when the key cylinder barrel is brought into engagement with the drive component on one side or other of the drive component depending on the handedness of the lock, the entraining lug on one end of the barrel's entraining member inserts into the through-bore in the drive component, and at the same time, a wedge-shaped tab on the circumference of the drive component's cylindrical portion becomes positioned beside the barrel's protruding entraining member, such that rotating the barrel in one direction causes the wider end of the entraining member to contact with the wedge-shaped tab on the drive component, and the entraining lug contacts with the ridge inside the drive component's through bore, thus causing the drive component to rotate in the same direction as the barrel, but rotating the barrel back the other way causes the wide end of the entraining member and the entraining lug to separate from the wedge-shaped tab and the ridge respectively whereupon the barrel can rotate all the way around until the wide end of the entraining member contacts with the other side of the wedge-shaped tab on the drive component and the entraining lug contacts with the other side of the ridge.
28. A lock as claimed in any one of the preceding claims which incorporates means for providing an indication to the user when the drive component reaches one or more or each of the respective lock opening, lock closing and deadlocking position is.
29. A lock as claimed in claim 28, wherein the said means comprises a mechanism that allows the user to physically feel when the drive component reaches one or more of the said positions.
30. A lock as claimed in any one of the preceding claims, having a deadlock indicator that comprises a tab which extends visibly out from the lock body when the lock is deadlocked, but which is retracted into the lock body out of sight when the lock is not deadlocked.
31. A lock for a sliding wing comprising

- a parrot beak rotatable between a locking position and an unlocking position to lock and unlock the wing respectively,
- a rigid operating component which is slidable in a linear fashion between a first position and a second position and which can engage with the parrot beak at a point on the parrot beak offset from the parrot beak's axis of rotation such that sliding the operating component into the first position causes the parrot beak to rotate into the unlocking position and sliding the operating component into the second position causes the parrot beak to rotate into the locking position, and
- a key operated drive component that can engage with the operating component and which is moveable between an opening position and a deadlocking position,

wherein moving the drive component into the opening position causes the operating component to adopt the first position and moving the drive component into the deadlocking position causes the operating component to adopt the second position.

32. A lock that can be converted from one handedness to the other handedness, the lock comprising lock furniture that can be inverted when converting the lock from one handedness into the other, a casing within which internal components of the lock can be mounted, the casing being mountable to the furniture but also removable and re-mountable to the furniture in an inverted orientation whereby when the lock is installed the orientation of the casing can be the same whichever handedness the lock is installed in, and a key cylinder mountable to the furniture but which can be removed, inverted and re-mounted to the furniture wherein the key cylinder can engage the components inside the casing from either side of the casing and the lock can be operated by turning a key in conventional directions which ever handedness the lock is installed in.
33. A lock having a lock tongue movable between a locking position and an unlocking position, a drive component in the lock that can be rotated to cause the lock tongue to move between the locking position and the unlocking position, and a key cylinder for rotating the drive component, the key cylinder being configurable to engage with the drive component from either side of the drive component, wherein the

engagement between the key cylinder and the drive component allows over 180° of lost motion of the key cylinder whichever side of the drive component the key cylinder engages from.

34. A lock substantially as hereinbefore described with reference to the drawings.