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A MULTIPLE POINT LOCKSET

Technical Field

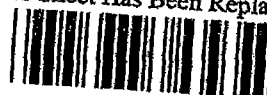
This invention relates to door locks and more particularly to door locks having provision for multiple point engagement.

Background Art

In doors of the kind designed to meet blast resistant standards it is generally necessary to provide multiple door locks at spaced apart locations. These door locks are normally positioned respectively closer to the top and bottom of a door than the conventional centrally located lock. Currently known multi point locksets are designed for security applications and typically include a conventional central lock incorporating both a latchbolt and a deadbolt and separate spaced apart deadlock mechanisms. In some arrangements the latchbolt is operated by a handle mechanism and a separate mechanism is provided to operate the deadbolts. This arrangement is satisfactory for some security applications, but is not suitable for use in a blast resistant door particularly where the door is required to also have a normal function for everyday use.

Some prior art multi point locksets seek to address this difficulty by providing a mechanism in which a single handle or lever is used for both latchbolt operation and to selectively engage the deadbolts. However, these arrangements incorporate a key lock to retain the deadbolts in the locked configuration and additionally do not have any prominent visual means of indicating the locked condition of the door. Similarly, locksets which include a latchbolt and a deadlock provide for extension of the deadbolt by means of a key and the separate operation of the latchbolt by a handle. There is, however, again no prominent visual means indicating the locked condition of the door. The provision of a visual indication is very desirable in the case of a blast resistant door. Indeed, in some countries legislation requires the provision of a means to indicate the secured condition of the door visually from both sides. This enables a person securing the door to be certain that the deadbolt is, or deadbolts are engaged and also enables emergency services to readily identify a secured door which would normally indicate that the room behind the door is occupied.

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It will be apparent that in relation to a blast resistant door of the kind of interest the term "locked" is not normally appropriate since the door can always be opened from either side. Throughout this specification the term "secured" will be used to refer to the simultaneous extension of the or each of the deadbolts associated with a lockset.

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Disclosure of the Invention

It is an object of this invention to provide a lockset for a blast resistant door which will both provide for normal operation of the door as an internal door and provide a visual indication of the secured condition of the door.

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Accordingly, in one aspect this invention consists in a lockset for a blast resistant door comprising a retractable latchbolt biased toward an extended position, at least one deadbolt operable to move between an extended position and a retracted position, a drive mechanism including a position indicating handle for each side of said door, said mechanism providing for manual rotation of said handle between a neutral position in which only said latchbolt is extended, a latchbolt withdrawn position, and a secured position in which said deadbolt is extended, the position indicative handles each moving in unison to said locked position to provide a visual indication of the locked condition from either side of said door.

20 Preferably, the lockset is a multiple point lockset which includes at least two deadbolts to move simultaneously and in use being mounted at spaced apart locations.

Preferably, the position indicative handle comprises a lever handle and each of the three positions corresponds to a position of the lever. In one form of the invention, the secured position is indicated by the handle extending upwardly. In this arrangement, the neutral position is that in which the lever is generally horizontal and the latchbolt withdrawn position is where the lever extends downwardly.

Preferably, the drive mechanism includes means to provide an audible indication of the handle moving into the secured position. In one embodiment the audible indication is provided by a

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resiliently biased pawl engaging a detent notch on one of the deadbolts as the deadbolt reaches the extended position.

5 In a preferred configuration the multiple point lockset has three deadbolts, one positioned adjacent the latchbolt and two further deadbolts respectively adapted to be positioned closer to the top and bottom of the door. Preferably, at least some of the deadbolts include means to bias the door toward the associated doorframe when the door is in the closed and secured position. The biasing is preferably provided by tapering of the deadbolts so that they urge the door towards the closed position as they engage a recess provided in the doorframe.

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Brief description of the Drawings

The invention will now be described, by way of example only, with reference to the accompanying drawings in which:

15 Figure 1 is a perspective view of a first mortice lock component of a multiple point lockset according to a first embodiment of this invention;

Figure 2 is a front view of the mortice lock component shown in Figure 1;

20 Figure 3 is a schematic perspective view showing the mortice lock of Figures 1 and 2, together with two deadlock assemblies forming part of the multiple point lockset according to the first embodiment of this invention, and also showing respective face plates for attachment to a door frame;

25 Figure 4 is a further schematic perspective view showing all of the components of the multiple point lockset according to the first embodiment of this invention;

Figure 5 is a perspective view of a mortice lock component of a multiple point lockset according to a second embodiment of this invention;

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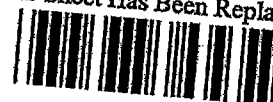




Figure 6 is a front view of the mortice lock component shown in Figure 5; and

Figure 7 is a schematic perspective view showing the mortice lock of Figures 5 and 6 together with two deadlock assemblies forming part of the lockset according to the second embodiment
5 of the invention.

Best modes of performing the Invention

Referring to Figures 1 and 2, there is shown a mortice lock 1 being a component of the multiple point lockset of the first embodiment. The mortice lock 1 is of substantially conventional
10 construction and includes a casing 2 into which the components are fitted and a cover plate 3 secured to the casing 2 by screws 4 (shown in Figure 3). A retractable latchbolt 5 is mounted in the casing 2 for reciprocal movement in the usual manner. The latchbolt is biased toward an extended position by a spring 6. The latchbolt 5 is mounted with a guide plate 7 that is provided with a slot 8 through which a boss 9 on the casing 2 extends. This arrangement provides for
15 alignment of the latchbolt 5. An actuating arm 10 is also attached to the latchbolt 5 at one end and is provided with an engagement portion 11 at its other end.

The mortice lock includes a cam spindle 12 provided with a square drive recess 13 accessible from either side through apertures in the case 2 and cover plate 3 respectively. The drive recess
20 13 receives a square drive shaft (see Figure 4). Cam spindle 12 has three radially separated drive cams 14, 15, 16. The first drive cam 14 includes a transversely extending pin 17, which in use contacts the engagement portion 11 of actuating arm 10 to extend and retract the latchbolt 5. Drive cam 15 is for extension and retraction of a deadbolt 18. Drive cam 16 has a transversely extending pin 19, which extends from the rear side of the casing 2 shown in Figures
25 1 and 2 through a curved slot 20 for actuation of remotely located deadbolts as described below. A torsion spring 21 is secured to cam spindle 12 to provide selected biasing of the cam spindle. Torsion spring 21 has an extension with a hooked end 22, which engages boss 9 if the cam spindle 12 is rotated clockwise as viewed in Figure 1. The biasing of the cam spindle 12 will be discussed in further detail below.





The deadbolt 18 is mounted in the casing 2 for reciprocal movement in the known way. As is the case with latchbolt 5, the deadbolt 18 is mounted by extended through an aperture in the casing 2 at one end, and by means of a slot 23 which cooperates with a boss 24 formed in the casing 2 at the other end. The upper edge 25 of deadbolt 18 is provided with two spaced apart
5 detent notches 26 and 27 respectively. One side of notch 27 is tapered at 28 whilst the other sides of both notches are squared at 29. A pawl 30 is resiliently biased by a spring 31 mounted on boss 24. The pawl acts against the upper edge 25 of deadbolt 18 and the deadbolt 18 can be positioned so that the pawl 30 engages either one of notches 26 or 27 respectively corresponding to the extended and retracted position of the deadbolt 18. The squared ends 29 of the remote
10 sides of the notches 26, 27 respectively limit the travel of the deadbolt 16. The engagement of the pawl 30 with a respective one of the notches 26, 27 provides a mechanical feel as the deadbolt 18 reaches the end of its travel in either direction, as well as an audible "click" as the pawl 30 moves into the notch 26, 27.

15 The lower edge of deadbolt 18 is provided with a drive slot 32, which is engaged by drive cam 15 during rotation of the cam spindle 12. This allows the cam spindle 12 to drive the deadbolt 18 between the extended and retracted positions.

As shown in Figure 4, a drive shaft 33 and a handle 34 are engaged with the aperture 13 of cam
20 spindle 12 in the known manner. In use, a handle 34 is provided on each side of the door (not shown) to which the lockset is fitted. The mortice lock 1 is shown in all drawings in the secured configuration in that deadbolt 18 is in its extended position. It will be apparent to those skilled in the art that latchbolt 5 operates in the normal manner. That is, by being resiliently biased outwardly the latchbolt 5 allows the door (not shown) to be pushed closed when the deadbolt
25 18 is retracted. With the deadbolt 18 extended, as shown in Figure 1, handle 34 is in an upwardly inclined position as shown in Figure 4. There is no biasing of the cam spindle 12 in this position and the handle 34 is thus maintained in this position by the engagement of drive cam 15 with drive slot 32 and the engagement of pawl 30 with notch 26. If handle 34 is moved downwardly to the horizontal position, cam spindle 12 rotates clockwise and the drive cam 15
30 cooperates with drive slot 32 to retract the deadbolt 18. This causes the pawl 30 to move out

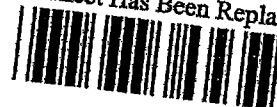


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of notch 26, traverse the edge 25 of the deadbolt 18. This causes the pawl 30 to move out of notch 26, traverse the edge 25 of the deadbolt 18 and move into notch 27. Rotation of handle 34 to the horizontal position also moves the hook end 22 of spring 21 into engagement with boss 9. Thus, any further clockwise rotation of cam spindle 12 by handle 34 will cause extension of the spring 21 so that the handle 34 is resiliently biased to the horizontal position against any downward movement. Movement of handle 34 and corresponding rotation of cam spindle 12 also brings pin 17 adjacent the engagement portion 11 of actuating arm 10. Further clockwise rotation of cam spindle 12 (that is, movement of the handle from the horizontal to the downwardly inclined position) will result in the latchbolt 5 being withdrawn by the movement of actuating arm 11 to the left in Figure 1 as pin 17 moves clockwise. Because the latchbolt 5 is biased to the extended position and the handle 34 is biased to the horizontal position, release of the handle 34 at any time it is inclined downwardly will result in the handle 34 returning to the horizontal position and the latchbolt 5 returning to its extended position. Thus, the mortice lock 1 operates as a conventional latchbolt type lock of the kind commonly used on internal doors. Movement of the handle 34 to the upwardly inclined position, however, extends the deadbolt 18 and the deadbolt remains extended whilst the handle is in the upwardly inclined position, thus, providing a visual indication of the secured state of the door. In addition, the engagement of pawl 30 with notch 26 provides both a mechanical feel as the deadbolt 18 moves into the extended position, and an audible sound. It will be appreciated that the described mortice lock 1 does not lock in the sense of providing security since the deadbolt 18 can be withdrawn by operation of the handle 34 from either side of the door to which the lock is installed.

Figure 3 shows the two additional deadbolt lock assemblies 35 that make up the multiple point lockset of the preferred embodiment. The operation of each of the deadbolt locks 35 is largely identical and only one of the assemblies will be described in detail. The same reference numerals have been used to indicate corresponding parts of the assemblies. The deadbolt lock 35 comprises a casing 36 which houses a deadbolt 37. The casing includes a cover plate 38 which is secured to the casing 36 by screws 39. The deadbolt 37 is mounted for reciprocal movement in a known manner by extending through apertures at either side of the casing 36 and

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by a transversely extending pin 40, which operates in slots 41 in the casing 36 and cover plate 38. A drive plate 42 is also mounted by extending through apertures in the casing 36. Drive plate 36 includes an inclined slot (not shown) through which transverse pin 40 extends. A connecting slot 43 is also provided in one end of drive plate 42.

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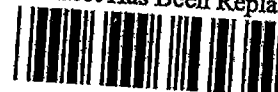
Movement of the drive plate 41, in a vertical direction as shown in Figure 3, causes the deadbolt 37 to be extended and retracted by the pin 40 being forced to move in the slot (not shown) in the drive plate 42.

- 10 Figure 3 also shows the face plates 44 and 45 that would normally be mounted into the door frame (not shown) associated with the door (not shown) to which the multiple point lockset is fitted. These face plates respectively have apertures 46, 47, 48 for the engagement of the deadbolts 18 and 37 and the latchbolt 15. The ends of deadbolts 37 are tapered at 49 so that they operate in the manner of a wedge as they are extended into apertures 47 of the face plates 44
- 15 to bias door (not shown) towards the door frame (not shown).

- Figure 4 shows the assembled configuration of the multiple point lockset according to this invention. The mortice lock 1 and the deadlock 35, as previously described, are interconnected by a connecting bar 50. Connecting bar 50 has a engaging slot 51, which cooperates with pin
- 20 19 extending from drive cam 16 through slot 20 in the casing 2. The remote ends of connecting bar 50 include a folded tab 52 which respectively engage connecting slots 43 in drive plates 42.

- Referring to the above description of the operational mortice lock 1, it will be apparent that rotation of the drive spindle 12 and hence, drive cam 16 clockwise from the position shown in
- 25 Figure 1 results in a downward movement of pin 19. This is translated into respective upward and downward movement of the drive plate 42 by connecting bar 50. The respective movement, in turn, causes the retraction of the deadbolt 37 as the handle 34 moves from the upwardly inclined position to the horizontal position. Thus, all three deadbolts 18, 37 are simultaneously retracted and extended by movement of the handle 34 between the inclined position and the
- 30 horizontal position. Movement of handle 34 from the horizontal position to the downwardly

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inclined position results in further clockwise rotation of cam spindle 12 (as described above), however, the corresponding movement of pin 19 is largely horizontal rather than vertical. Thus, the pin 19 moves along slot 51 in connecting bar 50 without causing other than a smaller amount of movement of the connecting bar 50. This small amount of movement can be accounted for
5 by appropriate shaping of the slots (not shown) in the drive plates 42, so as to ensure the deadbolts 37 are only moved as the handle 37 is moved between the horizontal and upwardly inclined positions.

Figures 5, 6 and 7 show a second embodiment of the invention. In this embodiment, a mortice
10 lock 60 contains only a latchbolt and a drive mechanism for externally positioned deadbolts.

Referring to Figures 5 and 6, the mortice lock component comprises a casing 61 into which the components are fitted and a cover plate 62 held in place by screws 63. A retractable latchbolt 64 is mounted in the casing 61 for reciprocal movement in the usual manner. The latchbolt is
15 biased toward an extended position by a spring 65. Mounting of the latchbolt is by means of extension through an aperture in casing 61 at 66, and the movement of a perpendicular tab 67 in a rectangular aperture 68 formed in the cover plate. An engagement portion 69 is formed at the end of the latchbolt 64.

20 The mortice lock includes a cam spindle 70 provided with a square drive recess accessible from either side through apertures in the case and cover plate respectively. The spindle receives a square drive shaft and handle configuration (not shown) in a manner identical to that described in relation to the first embodiment. The cam spindle 70 has two radially separated drive cams 71 and 72. The spindle 70 also has two detent recesses 73 and 74.

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A torsion spring 75 is mounted with the spindle 70 and has a hooked end 76, which engages a boss 77 if the spindle is rotated clockwise as shown in Figures 5 and 6. Boss 77 also mounts a leaf spring 78 which is formed with an engagement projection 79 at its free end. Spring 78 is biased against spindle 70 so that the engagement portion 79 can engage the detents 73 and 74
30 when they are respectively aligned during rotation of the spindle 70.

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A drive plate 80 is also mounted within the case 61. The drive plate is mounted by two slots 81, 82 formed in the drive plate through which bosses 83 and 84 extend to allow limited reciprocating movement of the drive plate. The upper and lower ends of the drive plate 80 respectively extend outside the casing 61 and terminate with connection slots 85 and 86. The
5 drive plate 80 has a drive recess 87 formed adjacent the spindle 70. Drive cam 72 is configured to engage the drive recess 87 and move the drive plate according to the rotation of spindle 70.

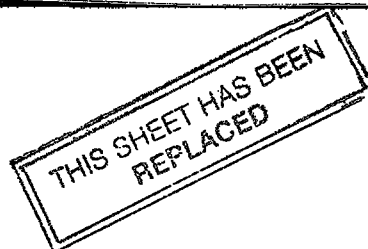
Figure 7 shows the majority of the components forming a lockset according to this invention. The mortice lock 60 is positioned centrally and two deadlock assemblies 90 are positioned
10 respectively above and below the mortice lock 60. The deadlock assemblies are generally similar to those described in relation to the first embodiment. In this regard, a drive plate 91 is moved reciprocally to, in turn, drive a deadbolt assembly 92 between an extended and retracted position. The manner of operation is the same as described above in relation to the first embodiment. In the embodiment illustrated in Figure 7, the extending portions 93 of the
15 deadbolts 92 are cylindrical and include a tapered end.

A connecting bar 94 is provided to interconnect the drive plate 80 in the mortice lock 60 with the drive plates 91 in the deadlocks 90 in the same manner as described above for the first
20 embodiment.

The operation of the arrangement shown in Figure 7 will now be described with reference also to Figures 5 and 6. The lockset and individual lock components are all shown in the secured position. That is, where the deadbolts 92 are extended. As will be apparent from Figures 5 and 6, the operating handle (not shown) associated with the door would, if in the form of a lever, be
25 inclined upwardly along the line A shown in Figure 6. Rotation of the spindle in the clockwise direction so that a handle fitted would be aligned with the aligned with the line B in Figure 6, results in withdrawal of the deadbolts 92. This is effected by drive cam 72 engaging with the upper edge of recess 87 and moving the drive plate upwardly as shown in Figure 6. This movement is translated to the deadlocks by connecting bar 94, which moves the drive plates 91
30 to withdraw the deadbolts 92. The movement of the cam spindle to this position also results in

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drive cam 71 moving around to almost abut drive projection 69 on the latchbolt 64. At the same time the rotation also results in the torsion spring hook 76 engaging boss 77.

Any further clockwise rotation of spindle 70 will thus be opposed by the bias of spring 75. That is, the spindle is biased toward the lever horizontal position (aligned with line 8) against any further downward movement. Rotation of the spindle 70 clockwise from the lever horizontal position results drive cam 71 bearing against engagement portion 69 to withdraw the latchbolt in the usual manner. It will be apparent that the drive cam 72 can pass through recess 87 in the anti-clockwise direction once the drive plate 80 has reached its upward or unlocked position.

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Movement of the spindle 70 in an anti-clockwise direction from the lever horizontal position results in drive cam 72 bearing against the lower edge of slot 87 to move the drive plate 80 into the locked position as the lever moves to the upwardly inclined position. The engagement of spring portion 79 with detents 73 and 74 respectively correspond to the lever inclined position and the lever horizontal position. The movement of the spring into the detents provides a positive "feel" as the lever assumes both the upwardly inclined secured position or the horizontal or normal operation position. An audible "click" is also heard as the spring portion 79 moves into the corresponding detent to provide an oral confirmation of the position of the lever.

20 The arrangement shown in Figure 7 includes only two securing deadlock assemblies. It will be apparent, however, that the connecting bar 94 can be lengthened, and any suitable number of deadlocks provided. In one preferred arrangement, two deadlocks are provided respectively above and below the mortice lock to provide a total of four deadlocks.

25 It will apparent that the foregoing describes a multiple point locksets in which the secured condition corresponding to the extension of the deadbolts is achieved by moving the handle from a horizontal to an upwardly inclined position. The handle remains in this position whilst the door is in the secured position thus providing a visual indication from either side of the door confirming extension of the deadbolts. In addition, the mechanism provides a mechanical feel and an audible sound as the handle is moved into the upwardly inclined position and the

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deadbolts extended. When the handle is moved to the horizontal position the deadbolts are withdrawn and the handle operates in the manner of a normal latchbolt handle by withdrawing the latchbolt if the handle is moved downwardly and being biased toward the horizontal position. This allows the door to which the multiple point lockset is fitted to be used as a normal internal
5 door, but also to provide for deadbolt securing as required. This makes the multiple point lockset is particularly useful for situations in which a blast resistant room might normally be used as a storeroom or the like, and requires unfettered and uncomplicated access.

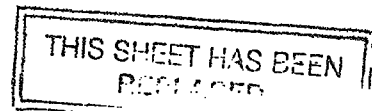
The foregoing describes only some embodiments of the invention and modifications can be
10 made thereto without departing from the scope of the invention.

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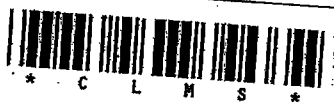
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The claims defining the invention are as follows:

1. A lockset for a blast resistant door comprising a retractable latchbolt biased toward an extended position, at least one deadbolt operable to move between an extended position and a retractable position, a drive mechanism including a position indicating handle for each side of said door, said mechanism providing for manual rotation of said handle between a neutral position in which only said latchbolt is extended, a latchbolt withdrawn position, and a secured position in which said deadbolt is extended, the position indicative handles each moving in unison to said secured position to provide a visual indication of the secured condition from either side of said door.
2. A lockset as claimed in claim 1, wherein said position indicative handle comprises a lever handle and each of positions corresponds to a position of the lever.
3. A lockset as claimed in claim 2, wherein said secured position is indicated by the lever extending upwardly, the neutral position corresponds to the lever extending generally horizontally, and in the latchbolt withdrawn position the lever extends downwardly.
4. A lockset as claimed in any one of claims 1, 2 or 3, wherein said drive mechanism includes means to provide an audible indication of said handle moving into the secured position.
5. A lockset as claimed in claim 4, wherein said audible indication is provided by engagement of a resiliently biased pawl with a detent notch in said deadbolt as the deadbolt reaches the extended position.
6. A lockset as claimed in claim 5, wherein the engagement of said pawl also provides a mechanical feel as the handle moves into the secured position.
7. A lockset as claimed in any one of claims 1 to 6, including at least two deadbolts

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operable to move simultaneously and in use being mounted at spaced apart locations.

8. A lockset as claim in claim 7, further comprising a third deadbolt operable to move between an extended position and a retracted position in unison with said at least two deadbolts, one of said deadbolts being adjacent said latchbolt and the other two of said deadbolts being adapted to be positioned respectively closer to the top and bottom of said door.

9. A lockset as claimed in claim 7, further comprising third and fourth deadbolts operable to move between an extended position and a retracted position with said at least two deadbolts, each of said deadbolts being spaced apart from said latchbolt with two of said deadbolts positioned between the top of said door and the latchbolt and two of said deadbolts positioned between the bottom of said door and the latchbolt.

10. A lockset as claimed in any one of claims 1 to 9, wherein said drive mechanism includes resilient biasing means to bias said handle toward the neutral position from the latchbolt withdrawn position.

11. A lockset as claimed in any one of claims 1 to 10, wherein said drive mechanism includes a cam spindle rotated by said handle, said cam spindle including drive cams to respectively withdraw said latchbolt and move the or each said deadbolt between the extended position and the retracted position.

12. A multiple point lockset as claimed in any one of claims 1 to 11, wherein the or each deadbolt is tapered to urge said door toward a closed position as the deadbolt is extended.

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