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(56) Documents Cited:
GB 1051029 A **EP 0156793 A**
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INT CL⁷ **E05B, F16C, F16D**
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(54) Abstract Title: **Spindle for connecting door handles to door latch has spring to maintain engagement**

(57) A door 1 carries opposed outer and inner operating handles 14, 20 arranged to operate a latch 10 by way of a rotatable spindle 5. Each end of the spindle 5 is engaged within a cavity 13, 21 within the respective handle. It is essential that the spindle 5 remains in engagement within both of the cavities. However, to cope with doors of different thicknesses, the outer handle 14 is often provided with an elongated cavity 13. To prevent the spindle 5 from sliding towards the outer handle and becoming disengaged from the cavity in the inner handle 20, a spring 7 is provided which is arranged to urge the spindle 5 towards the inner handle 20. For example, the spring 7 may abut a cross piece 6 on the spindle 5 and a surface 15 of the outer handle 12.

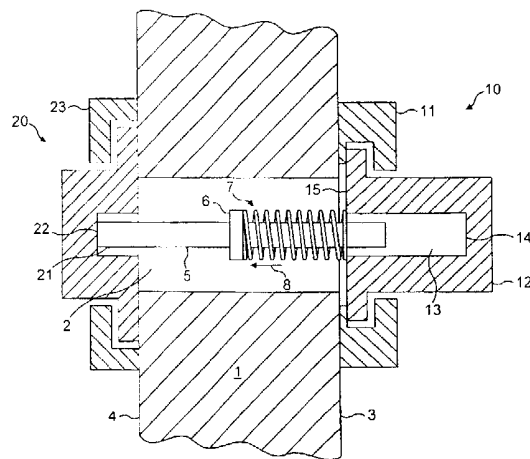


FIG. 1

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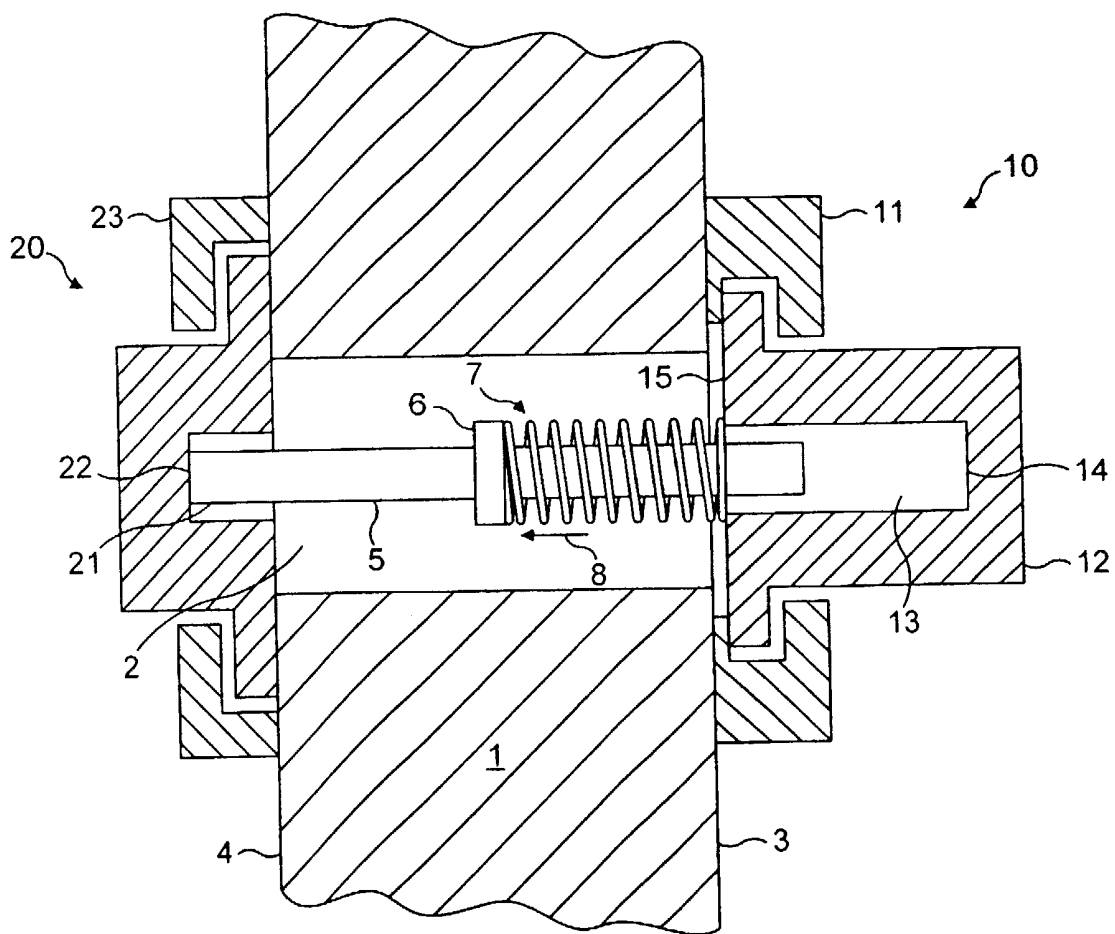


FIG. 1

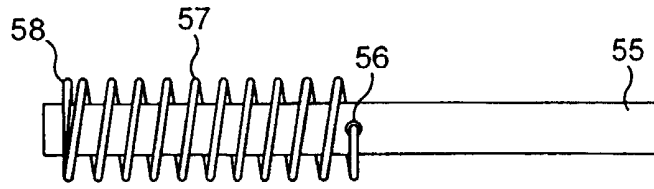


FIG. 2

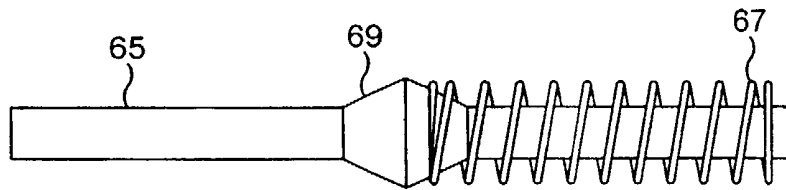


FIG. 3

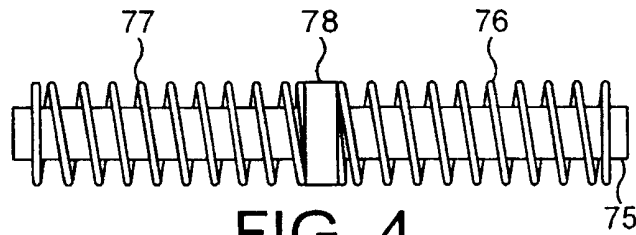


FIG. 4

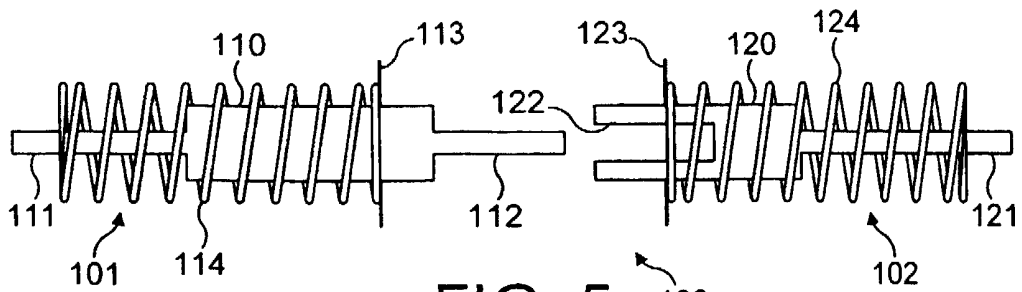


FIG. 5

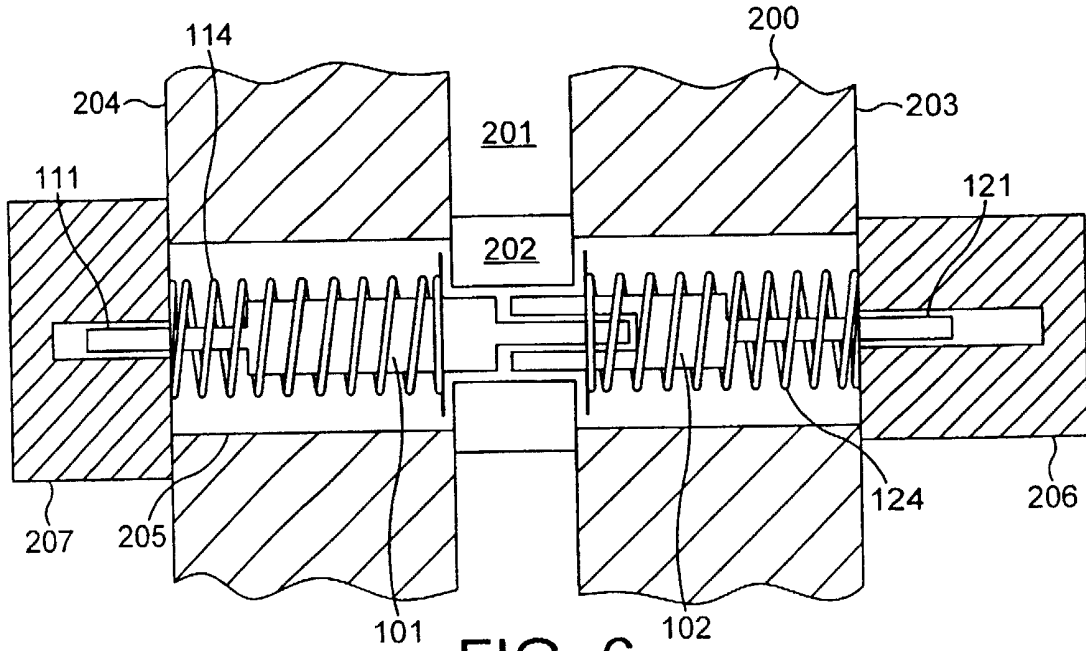


FIG. 6

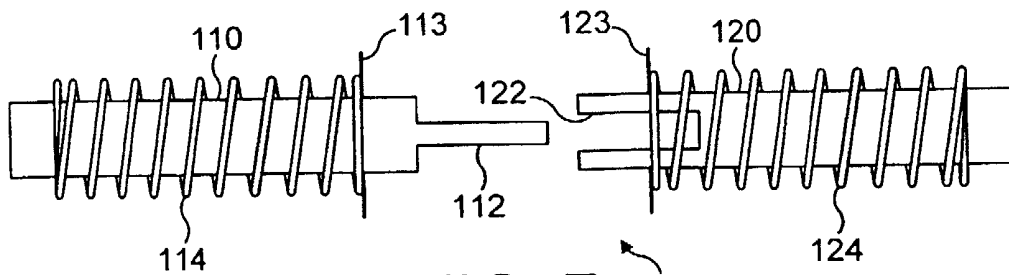


FIG. 7

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SPINDLE

The present invention relates to a latch or lock spindle, and to a latch and a lock incorporating such a
5 spindle.

In this document, for ease of reference, latches and locks are discussed as being fitted to a door. The term "door" is not to be interpreted as being restricted to
10 doors as such, but covers any member to which a lock or latch may be fitted.

When it is required to fit a latch or lock to a door, it is usual to secure operating devices such as handles to
15 both sides of the door, so that the latch or lock may be operated from either side. Some latches or locks are fitted within the confines of the door and some are fitted to the face of the door. Most usually a spindle carries the motion of the operating devices to the latch or lock
20 from one or both sides.

A disadvantage of prior spindles arises when very thin or very thick doors are used. Clearly the spindle must reliably engage both the operating devices if access
25 is to be assured, and this means that either different length spindles must be available or spindles must be cut to length. This can be time consuming for persons fitting locks or latches, and there is always the risk that a spindle that is too short may be used. Use of too short a
30 spindle can prevent access if the spindle moves out of engagement with one operating device.

Some operating devices are made to have a spindle housing space which is extended so as to allow the end portion of a spindle which is over-long to be housed within it. Then spacers can be used within this housing space where a thick door is used. This solution is however
5 fiddly and open to misuse especially for do-it-yourself.

It would be advantageous to develop a spindle capable of reliable fitting within a wide range of door thickness.
10

According to a first aspect of the invention there is a latch or lock spindle having opposed ends and a spring extending along the spindle from a location intermediate the ends, the arrangement being such that force exerted on
15 the spring is transferred to the spindle.

Such a spindle may be used with doors or other members of differing thickness to retain the spindle in engagement with its operating devices. The ability to
20 assure the ability to open a door may be critical in the event of a fire.

Preferably the spring is a helical spring disposed about the spindle.
25

In one embodiment, the spring is secured to the spindle at said location intermediate the ends.

The spring may pass through a hole or slot in the
30 spindle.

In another embodiment, the spring rests against an abutment at said location intermediate the spindle ends.

5 The spindle may have a disc or other stop secured to its periphery against which the spring abuts. The spindle may have a surface formation, and the spring be shaped or dimensioned to engage the surface formation. The shaping of the spring may comprise a constriction of the spring diameter.

10

In one embodiment, the spring extends from said location to a position on said spindle between said location and one of said spindle ends.

15

This embodiment is advantageous where one spindle-operating device has a spindle housing length that is substantially greater than the spindle housing length of the other spindle-operating device to allow for different door thickness. If the spring is disposed with respect to the one operating device so as to urge the spindle outwardly from that one device, the arrangement may be such as to maintain the spindle in engagement with both operating devices. In the absence of the spring and with a door of great thickness, a spindle may disengage from the other operating device by shifting into the spindle housing length of the one spindle-operating device.

20
25

In another embodiment, the spring extends from said location towards both ends of the spindle.

30

This embodiment is advantageous where both spindle-operating devices have a substantial spindle housing

length to allow for different door thickness. In the absence of the spring and with a door of great thickness, a spindle may disengage from one or the other of the other devices by shifting into the spindle housing length of the
5 respective spindle-operating device.

Where the spring stops short of the spindle ends, the parts of the spring free of the spring are readily engaged in a co-operating spindle actuation device.

10

In an alternative embodiment, a further spring extends along the spindle in a direction opposed to the direction of the said spring.

15 According to a second aspect of the invention, there is provided a door latch having a latch member, a spindle for moving the latch member from a closed to an open position, and first and second operating devices for securing to each side of a door, the spindle having
20 opposed ends and a spring extending along the spindle from a location intermediate the ends, the arrangement of the spring and spindle being such that force exerted on the spring is transferred to the spindle, the spring in use engaging one of said operating devices, whereby the
25 resilience of the spring opposes a tendency for the spindle to move towards said one operating device.

Conveniently the operating devices comprise door handles.

30

According to a third aspect of the invention, there is provided a lock having a latch member, a spindle for

moving the latch member from a closed to an open position,
an operating device for securing to on one side of a door
and a locking device for securing to a second side of a
door, the spindle adapted to engage said operating device
5 and said locking device, the spindle having opposed ends
and a spring extending along the spindle from a location
intermediate the ends, the arrangement of the spring and
spindle being such that force exerted on the spring is
transferred to the spindle, the spring in use, engaging
10 the locking device, whereby the resilience of the spring
opposes a tendency for the spindle to move towards said
locking device.

Advantageously the locking device comprises a
15 combination lock operable to lock a second operating
device associated therewith, to prevent movement of said
second operating device.

In an advantageous embodiment, the combination lock
20 is a push-button lock.

Exemplary embodiments of the invention will now be
described with reference to the accompanying drawings in
which:-

25 Figure 1 shows the cross sectional view through a
door having a face-mounted latch and a spindle in
accordance with an embodiment of the present invention;

Figure 2 shows a second embodiment of a spindle in
accordance with the present invention;

30 Figure 3 shows a third embodiment of a spindle in
accordance with the present invention;

Figure 4 shows a fourth embodiment of a spindle in accordance with the present invention;

Figure 5 shows an exploded cross-sectional view through a fifth embodiment of a spindle in accordance with the present invention;

Figure 6 shows a partial cross-sectional view through a door showing the fifth embodiment of the spindle in use; and

Figure 7 shows a view similar to that of Figure 5 of a modified version of the fifth embodiment.

Referring to Figure 1, a door 1 has a through hole 2 extending between a first door face 3 and a second door face 4. A latch 10 is secured to the first face 3 and a handle 20 is secured to the second face 4. A spindle 5, having the form of a thin strip, extends through the through hole 2 and engages with the latch and the handle to allow for operation from both sides.

The latch consists of a collar 11 rotatably retaining an operating handle 12. The operating handle 12 is secured to a latch member so as to be capable of moving the latch member between opened and closed positions permitting or preventing opening of the door. Details of the latch are not significant to the present invention and thus are not shown. It should however be noted that the latch in some embodiments contains a locking device for securing the latch member in the closed position whereby the door cannot be opened. In some embodiments, the locking device is a deadlock whereby the latch member is held closed, and in other embodiments the latch only decouples movement of the latch member, from the latch handle, so that the door

may be opened from the handle side 4. The operating handle 12 of the latch has a wall which defines a cavity 13 internal to the handle 12.

5 The handle 20 also has a wall defining a cavity 21 but the cavity 21 is not so deep as the cavity 13. The handle 20 is secured to the face 4 of the door via an annular collar 23 which has a circular recess for engaging a flange portion of the handle 20.

10

 The cavity 13 of the latch operating member is provided so that when the latch is secured to a door having a lesser thickness than the door 1, the spindle 5 can be used without cutting it so as to shorten it. When
15 the latch is secured to such a thinner door, the end of the spindle 5 within the cavity 13 extends closer to the end wall 14 of the cavity.

 The spindle 5 is of metal. Further reference to
20 Figure 1 shows that it is an elongate generally rectangular member having opposed ends, and with a cross piece 6 such as a spring washer or pressed-part, extending laterally in its central region. A helical spring 7 is dimensioned so as to pass over the majority of the spindle
25 5 but so as to abut the cross piece 6 at one end of the spring. The other end of the spring is engaged by an internal face 15 of the operating handle 12 of the latch so as to urge the spring 7 away from the handle 12. This is in the direction marked with the arrow 8, i.e. towards
30 the door handle 20. The effect of this is apply force via the spring to the cross piece 6, thereby to urge the spindle in the direction shown by arrow 8. The result is

that the end of the spindle 5 which is within the door handle 20 is brought into abutment with the end wall 22 of the cavity 21 within the handle 20.

5 Conventional spindles do not have the cross piece 6 nor the spring 7 disposed on them. Consideration of Figure 1 shows that in the absence of such a spring, it would be possible for the spindle 5 to move further into the cavity 13. If the spindle moved so as to abut the end
10 wall 14 of the cavity 13 of the latch operating handle then the other end would no longer engage with the cavity 21 of the handle 20. It would then no longer be possible to operate the latch from both sides.

15 Figure 2 shows an alternative spindle 55 which is a generally elongate strip of metal having a hole 56 in its central region through which an end portion of a spring 57 is secured. The other end 58 of the spring extends part way along the spindle but not to its end. This is to
20 allow for ease of mounting to a latch or lock operating member. However it is envisaged that springs which extend to the end of a spindle could be used instead.

 Figure 3 shows another alternative spindle 65 which
25 has two opposed rectangular strips extending from a central regional 69 in which the width of the spindle tapers outwardly. A spring 67 is disposed around one or both ends of the spindle and abuts the outwardly tapering wall of the central portion 69 which prevents its passage
30 along the entire spindle.

Figure 4 shows a spindle 75 generally similar to the spindle 5 of Figure 1 but having two springs 76, 77 extending outwardly from the central region 78. Such an arrangement allows a spindle to be centralised between two
5 operating members each having a cavity.

Although the invention has been described in the context of a metal spindle in the form a strip, it is also applicable to spindles of square cross sections such as
10 are used in conventional door latches.

In an advantageous embodiment, the spindle of the invention is used in the context of a security lock, for example a push button or other combination type of
15 security lock. Such a lock conventionally locks a handle accessible from the security side, but it is desired always to be able to open the door from the side not having the push buttons or combination device.

20 Where a spindle passes through a latch, for instance a mortice latch or lock within a door, the projection or other spring abutments is positioned along the spindle to avoid interfering with the latch. Where two springs are provided, one is removed prior to inserting the spindle
25 into the latch. A removable pin e.g. a split pin, may provide for abutment of the second spring on use. In the alternative, the abutment may be a spring washer engaging the surface or the spindle.

30 Referring now to Figure 5, a two-part spindle 100 is shown. As shown in the drawing, the left-hand part 101 has a generally square section metal bar 110, whose outer

dimensions are such as to engage with the square hole in the rotary collar of a lock case. The left-hand, as shown, end of the metal bar 110 is prolonged by a metal strip portion 111 which is rectangular in cross-section and is dimensioned to engage with the rectangular aperture of a combination lock. The portion 111 is co-axial with the longitudinal axis of the bar 110. At the opposite, right-hand as shown, end of the bar 110, the bar extends into a circular pin 112 whose function will be described later herein. Around 10mm from the right-hand end of the bar 110 there is secured a washer 113 which extends circumferentially about the bar 110 and normally to its longitudinal axis. A first spring 114 is dimensioned to pass over the bar 110 and to abut the washer 113. The spring 114 extends along at least a part of the rectangular spindle 111.

The right-hand part 102 of the spindle 100 is somewhat similar to the left-hand part 101 in that it has a rectangular bar 120, a projecting rectangular spindle portion 121, a washer 123 and a spring 124. However instead of a projecting pin similar to pin 112 of the first part, instead the bar 120 contains a circular recess 122 along its longitudinal axis for mating with the pin 112.

Referring to Figure 6, a door 200 has an aperture or slot cut into its side face to receive a lock case 201 having a rotary actuating collar 202 which has a square hole. The door has first and second opposing faces 203 on the right-hand side of the drawing as shown and 204 on the left-hand side of the drawing as shown. To secure the

spindle into engagement with the collar 202 of the lock case, one of the parts 100 or 102 is inserted through a hole 205 which registers with the hole in the lock case until the square end portion inside the washer 113 or 123
5 engages with the hole. Then the other part, 102 or 101 respectively, is inserted through the hole 205 from the other side of the door so that the pin 112 and the aperture 122 mate together. In the embodiment described, the pin 112 is a generally loose fit in the aperture 122
10 so as to allow for misalignment of the two halves of the spindle. Finally, operating members 206, 207 which are for example handles or combination locks are engaged with the projecting spindle portions 111 and 121, faces of these operating members engaging the ends of the springs
15 114, 124. The effect of the engagement with the springs is to urge the two halves of the spindle towards the lock case 201 to ensure that there is always operating engagement between the operating devices 206, 207 and the lock case 202. As can be seen in Figure 6, the ends of
20 the extended spindle portions 111, 121 do not extend the full depth of the operating members. If the springs 114, 124 were not present, then the engagement with the lock case could be lost.

25 The embodiment shown in Figures 5 and 6 has strip portions 111 and 121 which have thickness reduced with respect to the bar portions 110 and 120. This is to allow for operation by actuating members having slots, as opposed to conventional square recesses.

30

Referring to Figure 7, a two-part spindle 200 is generally similar to the embodiment of Figures 5 and 6

save for the square section bar 110, 120 extending for the whole of the length of the spindle parts.

Embodiments of the invention may alternatively have
5 springs within a two-part spindle, the springs serving to urge the two parts of the spindle away from one another and into engagement with operating devices.

Embodiments of the present invention have been
10 described with particular reference to the examples illustrated. However, it will be appreciated that variations and modifications may be made to the examples described within the scope of the present invention.

CLAIMS

1. A latch or lock spindle having opposed ends and a spring extending along the spindle from a location
5 intermediate the ends, the arrangement being such that force exerted on the spring is transferred to the spindle.
2. A latch or lock spindle according to Claim 1 wherein the spring is a helical spring disposed about the spindle
10
3. A latch or lock spindle according to Claim 1, 2 or 3 wherein the spring is secured to the spindle at said location intermediate the ends.
- 15 4. A latch or lock spindle according to Claim 1, 2 or 3 wherein the spring rests against an abutment at said location intermediate the ends.
5. A latch or lock spindle according to Claim 1 or 2
20 wherein the spring extends from said location to a position on said spindle between said location and one of said spindle ends.
6. A latch or lock spindle according to Claim 1 or 2
25 wherein the spring extends from said location towards both ends of the spindle.
7. A latch or lock spindle according to any of Claims 1-
5 having a further spring extending along the spindle in a
30 direction opposed to the direction of the said spring.

8. A latch of lock spindle according to Claim 7 wherein the further spring may be removed for installation of the spindle.

5 9. A door latch having a latch member, a spindle for moving the latch member from a closed to an open position, and first and second operating devices for securing to each side of a door, the spindle having opposed ends and a spring extending along the spindle from a location
10 intermediate the ends, the arrangement of the spring and spindle being such that force exerted on the spring is transferred to the spindle, the spring in use engaging one of said operating devices, whereby the resilience of the spring opposes a tendency for the spindle to move towards
15 said one operating device.

10. A door latch according to Claim 9, wherein the operating devices comprise door handles.

20 11. A lock having a latch member, a spindle for moving the latch member from a closed to an open position, an operating device for securing to on one side of a door and a locking device for securing to a second side of a door, the spindle adapted to engage said operating device and
25 said locking device, the spindle having opposed ends and a spring extending along the spindle from a location intermediate the ends, the arrangement of the spring and spindle being such that force exerted on the spring is transferred to the spindle, the spring in use, engaging
30 the locking device, whereby the resilience of the spring opposes a tendency for the spindle to move towards said locking device.

12. A lock according to Claim 11 wherein the locking device comprises a combination lock operable to lock a second operating device associated therewith, to prevent movement of said second operating device.

13. A spindle constructed and arranged substantially as herein described with reference to or as shown in Figure 1, 2, 3, 4, 5, 6 or 7 of the accompanying drawings.

10

14. A latch constructed and arranged substantially as herein described with reference to or as shown in Figure 1, or Figure 1 as modified by Figures 2, 3 or 4, or Figure 5, 6 or 7 of the accompanying drawings.

15

15. A lock constructed and arranged substantially as herein described with reference to or as shown in Figure 1, or Figure 1 as modified by Figures 2, 3 or 4, or Figure 5, 6 or 7 of the accompanying drawings.



Application No: GB 0214255.2
Claims searched: 1-15

Examiner: Peter Middleton
Date of search: 27 November 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-5, 9-11	GB 1051029 A (TOWNE) whole document
X	1-5, 9-11	EP 0156793 A (UNTERRAINER) see figures and WPI abstract Accession Number 1985-203387
X	1-5	US 4834433 A (KELLER) whole document
A		WO 9425709 A (GALINDO) whole document
A		JP 2001254538 A (INAGA) see figures and WPI abstract Accession Number 2001-635244

Categories:

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&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKCV:

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Worldwide search of patent documents classified in the following areas of the IPC⁷:

E05B
 F16C
 F16D

The following online and other databases have been used in the preparation of this search report:

EPODOC, WPI, JAPIO