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Chen

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(54) **DOOR LOCK MECHANISM**

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E05B 1/00 (2006.01)
E05B 55/06 (2006.01)

(52) **U.S. Cl.**
CPC ***E05B 55/005*** (2013.01); ***E05B 1/003*** (2013.01); ***E05B 55/06*** (2013.01)

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USPC 70/244
See application file for complete search history.

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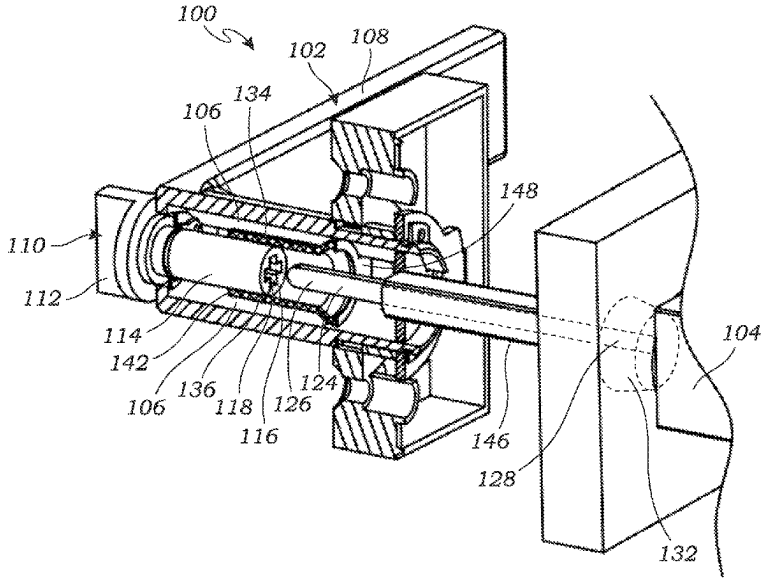
(57) **ABSTRACT**

Improved door lock mechanisms and kit for assembly into the same. The door lock mechanisms include a guide sleeve having a tapered portion for guiding a locking lever into a cross-hole of a locking bar. The cross-hole also allows the locking lever to be inserted into the cross-hole at multiple different orientations of the locking bar.

16 Claims, 5 Drawing Sheets



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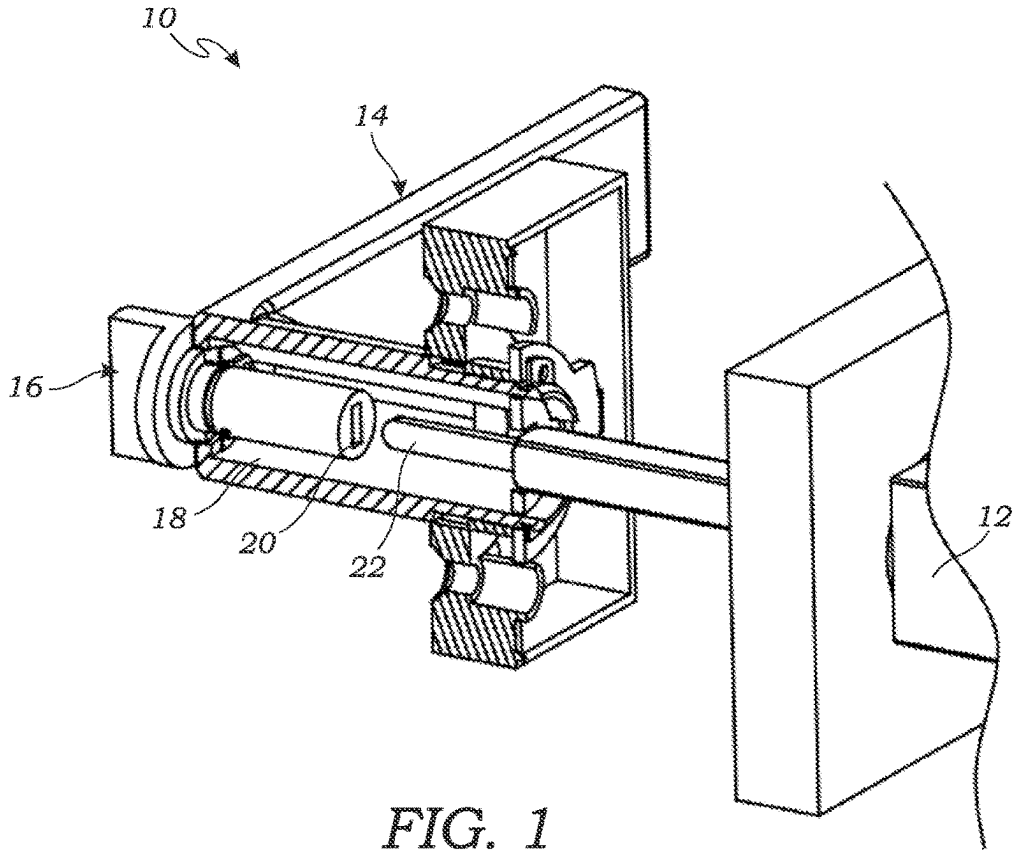

FIG. 1

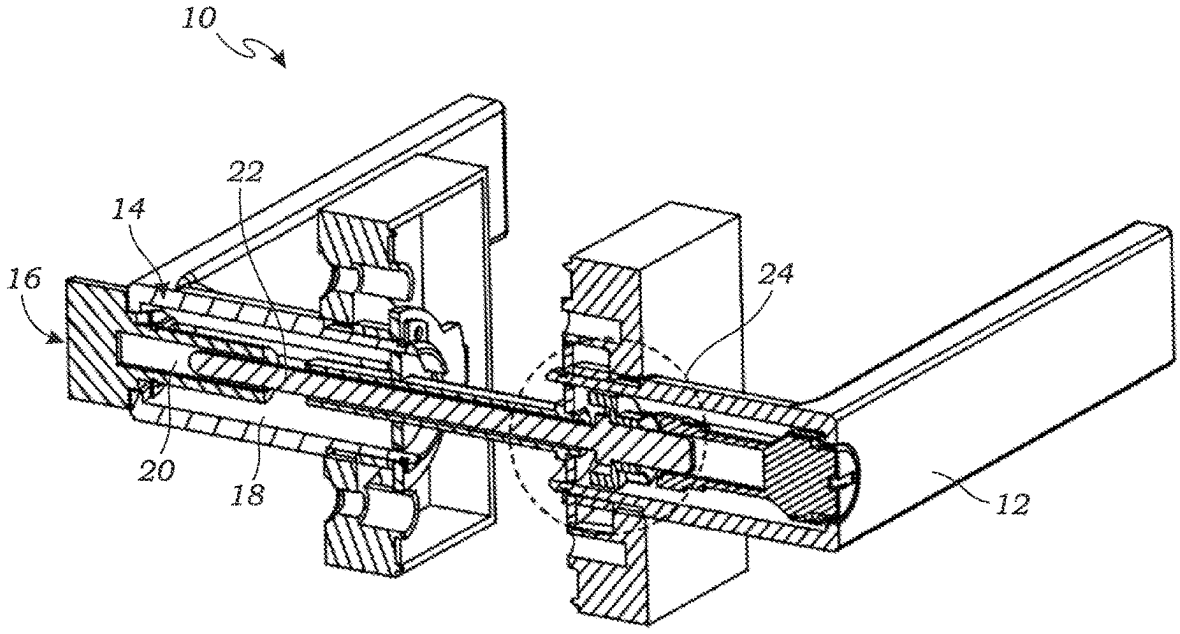

FIG. 2

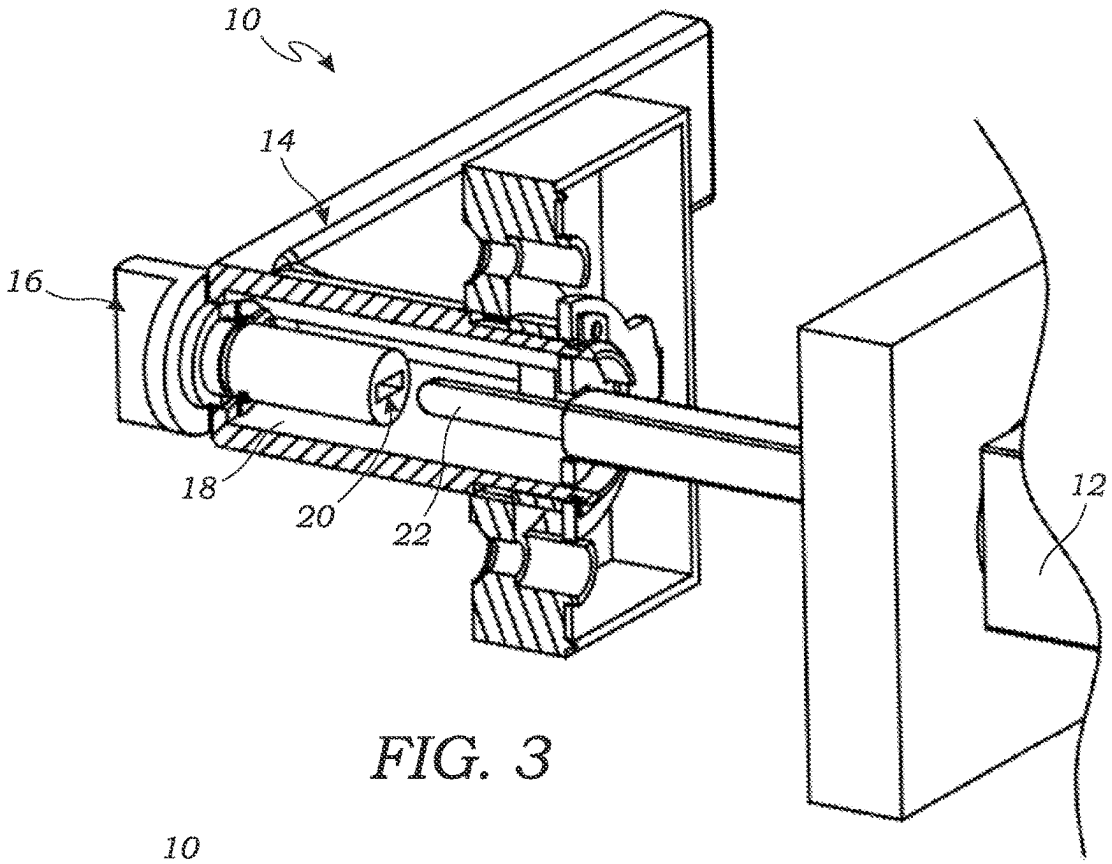

FIG. 3

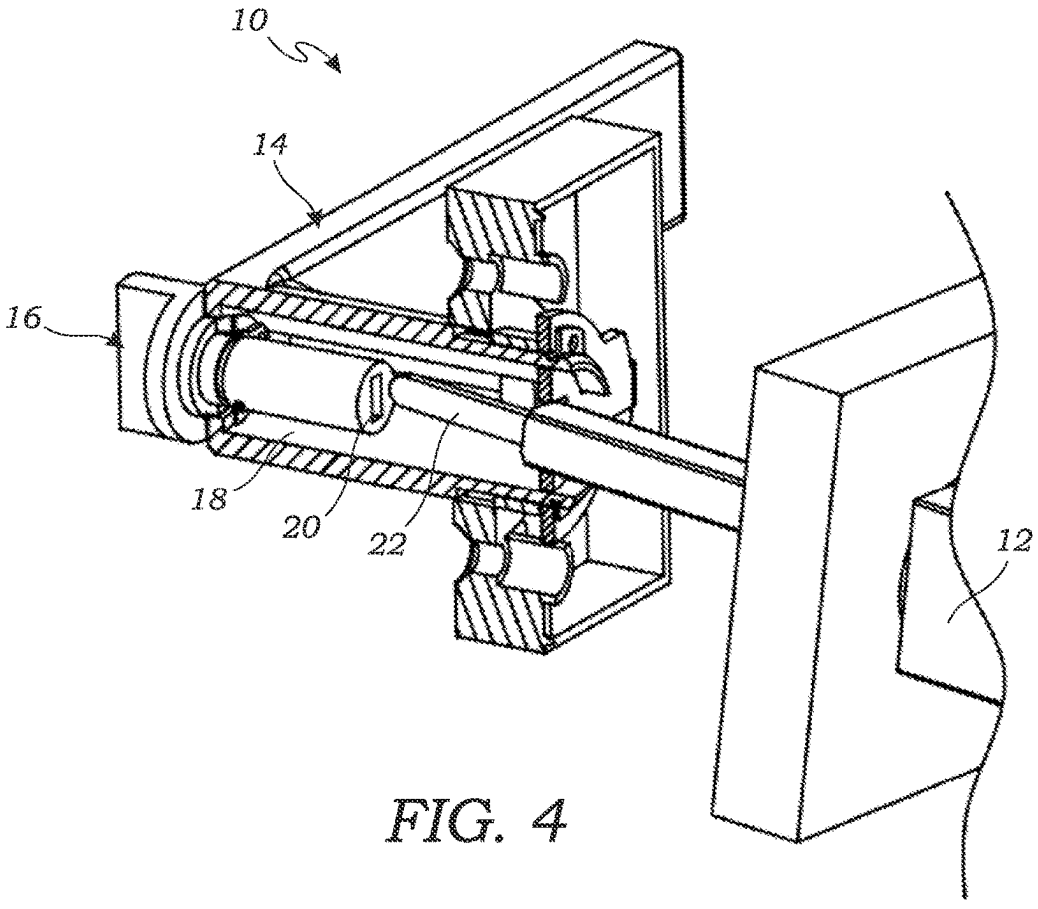

FIG. 4

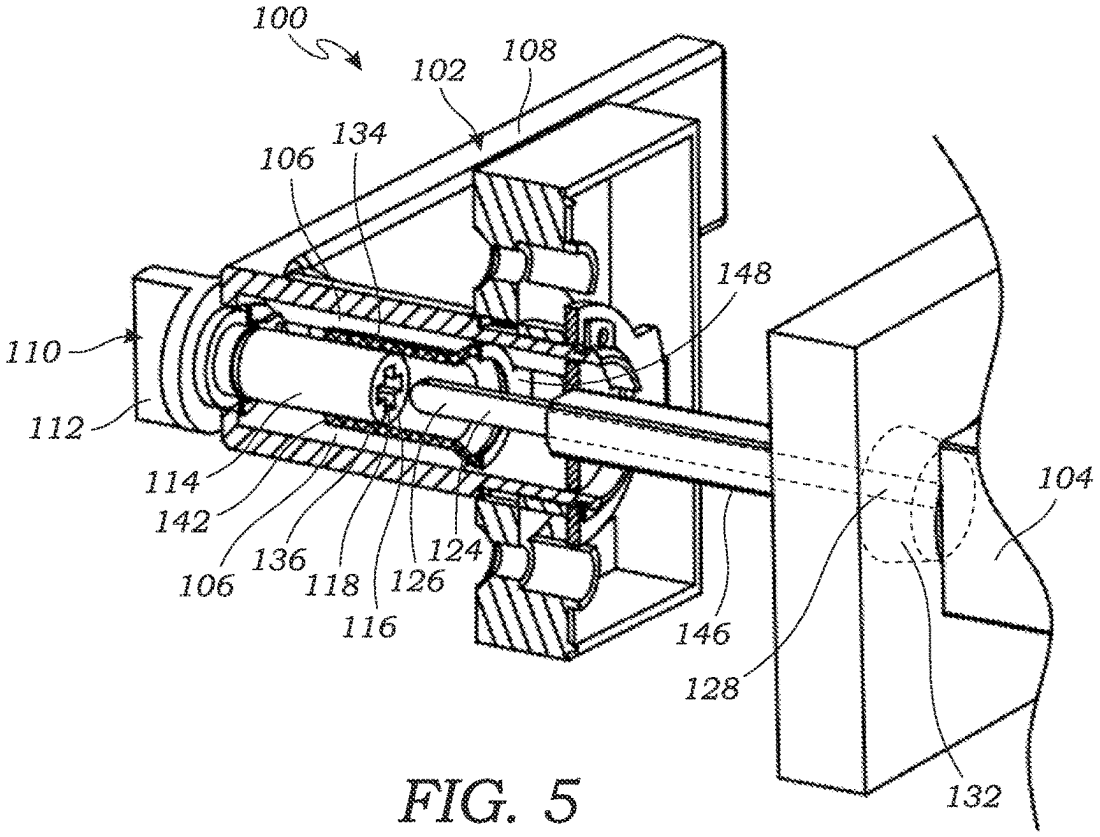

FIG. 5

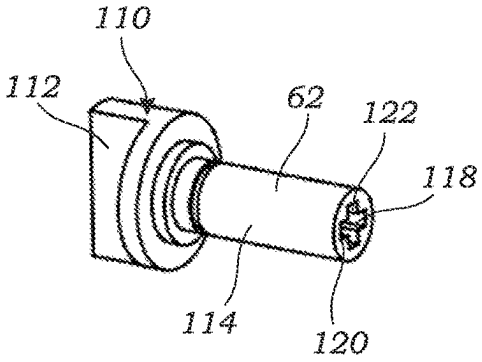

FIG. 6

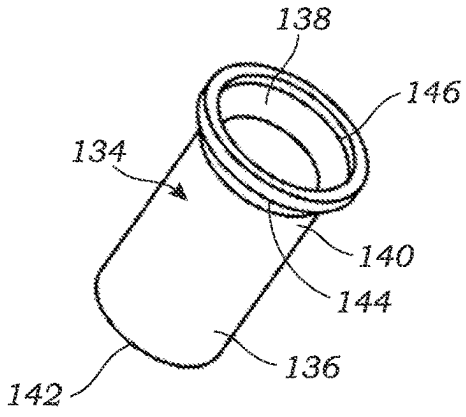

FIG. 7

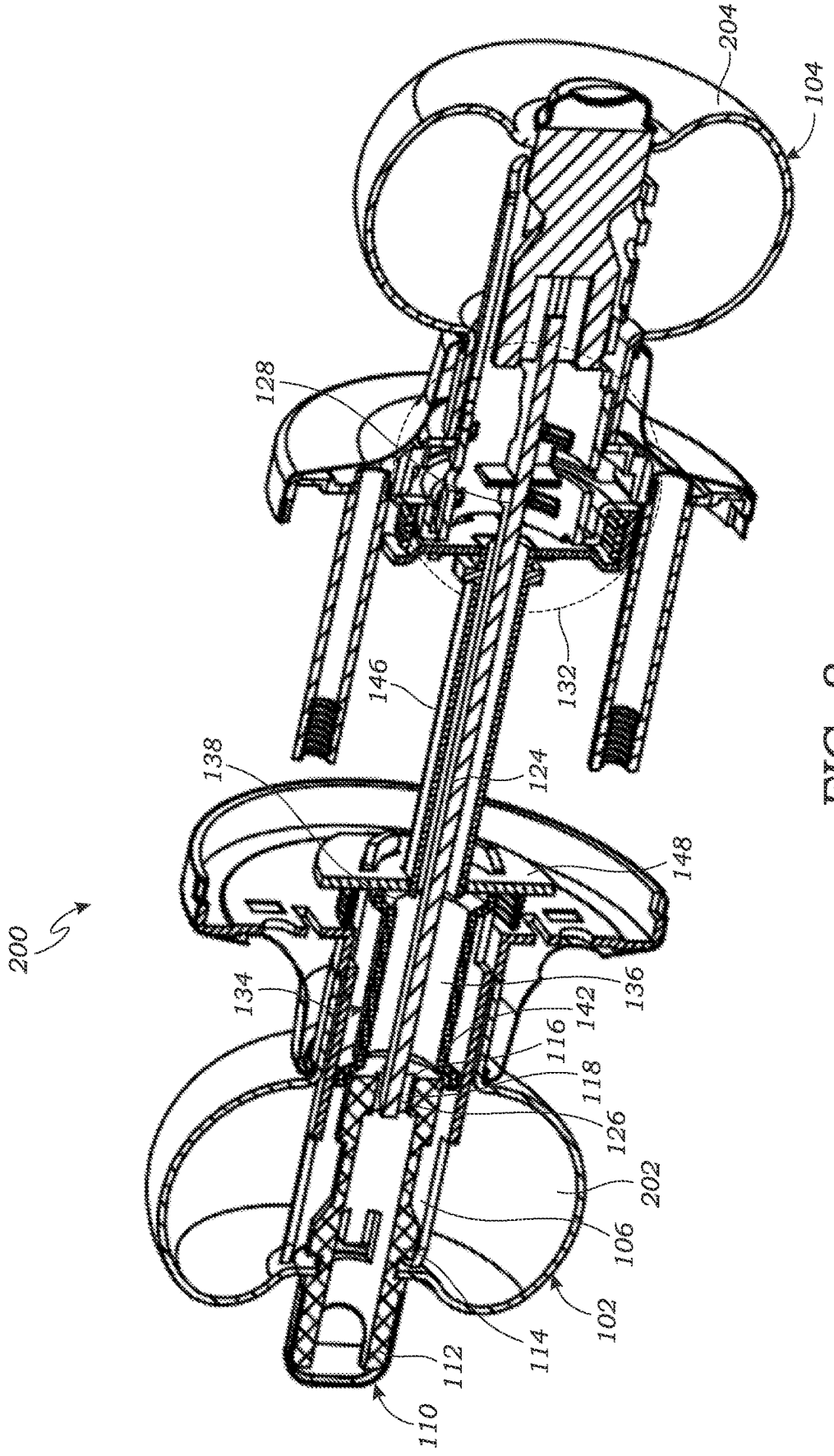
200
204
104
128
146
132
138
124
148
134
136
142
116
118
126
202
106
102
114
112
110

FIG. 8

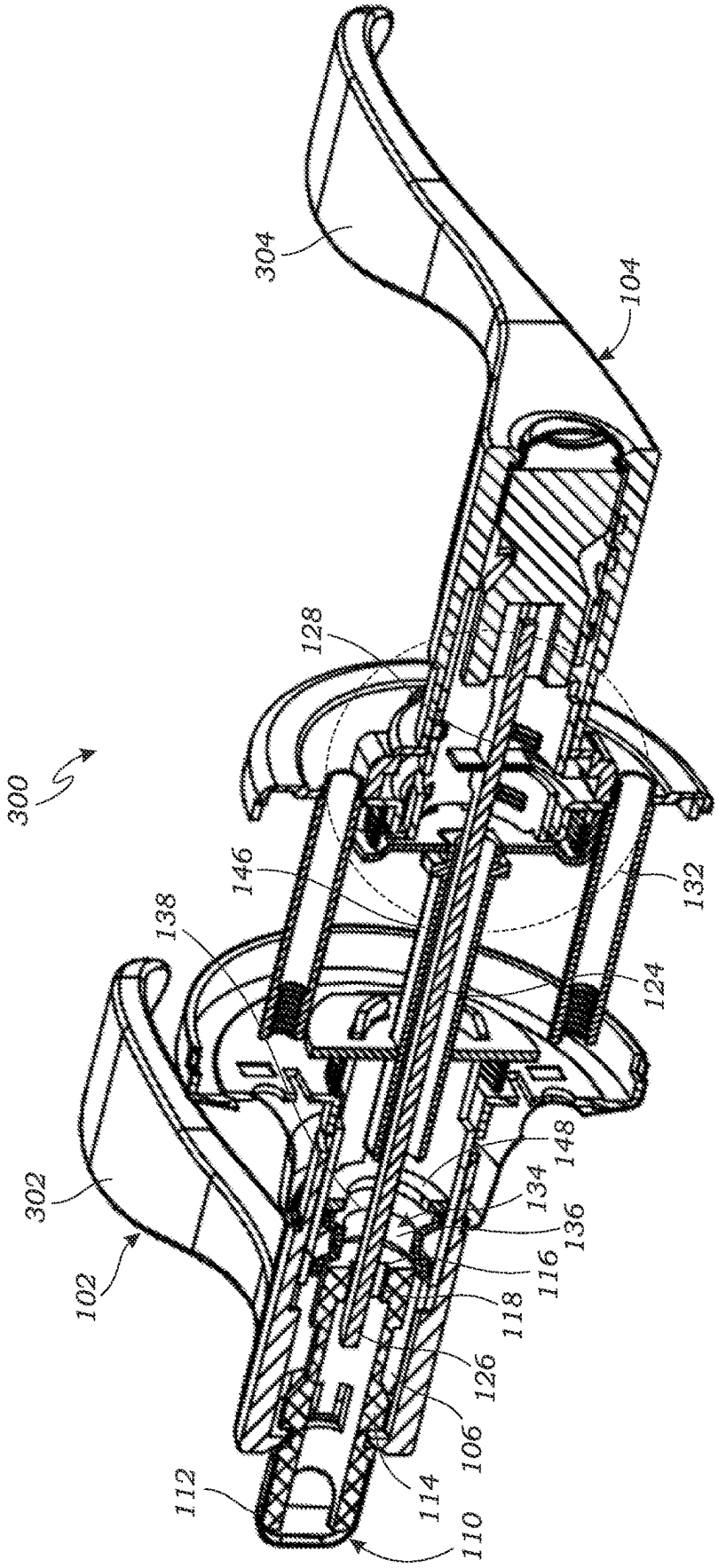
304
104
128
300
146
138
132
124
148
134
136
302
116
102
118
126
106
112
114
110

FIG. 9

DOOR LOCK MECHANISM

BACKGROUND

The field of the invention generally relates to door handle mechanisms, and more specifically to a door handle lock mechanism that provides for easy and quick installation and allows variable installation orientations for a locking knob when the door handle lock mechanism is installed on a door.

A conventional residential door lock mechanism typically includes an outer handle configured to be positioned on the outside of the door, and an inner handle coupled to the outer handle and configured to be positioned on the inside of the door. The outer handle and inner handle are coupled to a door latch bolt such that rotating the outer handle and inner handle retract and extend the door latch bolt. In a closed state, the door latch bolt is extended to engage with a strike plate mounted in a door jamb in which the door is installed. In an open state, the door latch bolt is retracted from the strike plate thereby allowing the door to be opened. The door lock mechanism may also have a locking feature. When the locking feature is in a locked state, the outer handle is locked from retracting the door latch bolt such that the door latch bolt cannot be retracted by turning the outer handle. The locking feature may operate in various ways. For one, the locking feature may prevent the outer handle from being turned to retract the door latch bolt. Alternatively, the locking feature may be a clutch mechanism that is configured to disengage the outer handle from the door latch bolt such that turning the outer handle does not retract the door latch bolt.

Referring to FIGS. **1-4**, one example of a conventional residential door lock mechanism **10** is illustrated. The door lock mechanism includes an outer handle **12** and an inner handle **14**. A locking knob **16** is inserted through the inner handle **14** into a cylinder **18** of the inner handle **14**. The locking knob **16** has a knob slot **20** for receiving a safety locking lever **22**. The locking lever **22** is coupled to a locking mechanism **24** which is configured to lock and unlock the outer handle **12** depending on the position of the locking lever **22**. The locking knob **16** is rotatable from an unlocked position (with the flat sides of the locking lever **22** oriented vertically) as shown in FIG. **1**, to a locked position (with the flat sides of the locking lever **22** oriented horizontally). When the locking knob **16** is rotated from the unlocked position to the locked position, the locking knob **16** rotates the locking lever **22** from an unlocked position to a locked position, which in turn actuates the locking mechanism **24** from an unlocked position to a locked position. Turning the locking knob **16** from the locked position to the unlocked position rotates the locking lever **22** from the locked position to the unlocked position, which in turn actuates the locking mechanism **24** from the locked position to the unlocked position.

As shown in FIG. **3**, if the locking knob **16** is rotated to the locked position during installation and assembly of the door lock mechanism **10**, the locking lever **22** cannot be inserted into the knob slot **20**. Similarly, as shown in FIG. **4**, if the outer handle **12** is tilted or slanted during assembly, the locking lever **22** also cannot be inserted into the knob slot.

Accordingly, during assembly of the door lock mechanism **10**, if the locking lever **22** is not inserted into the knob slot **20**, the door lock mechanism **10** cannot be locked and/or unlocked because the locking knob **16** is not coupled to the locking lever **22**. This requires that the locking knob **16** and the locking lever **22** be precisely oriented and rotated to allow the locking lever **22** to be inserted into the locking knob **16** during assembly. This can be a very difficult and frustrating task for the installer because it is a blind assembly wherein the mating locking lever **22** and locking knob are typically not visible within the door lock mechanism **10** during as they are being mated together. Furthermore, the locking knob **16** has only one possible rotational position for proper assembly.

Accordingly, there is a need for an improved door lock mechanism which provides for easier and faster installation and also allows for the locking knob to be installed at different rotational orientations as desired by the user.

SUMMARY

The present disclosure is directed to improved door lock mechanisms, and kits for being assembled into such door lock mechanisms, which allow for simple and easy installation on a door. The improved door lock mechanism may also allow for variable rotational orientations for a locking knob, as desired by the user. The improved door lock mechanisms are described herein for a residential door installation, but may be used in any suitable door lock mechanism, including residential and commercial door lock devices.

Accordingly, in one embodiment of the present invention, a door lock mechanism includes an outer handle and an inner handle each coupled to a door latch bolt such that rotating either of the outer handle and inner handle retracts and extends the door latch bolt. The door lock mechanism also includes a locking knob assembly comprising a locking knob connected to a locking bar. The locking knob is on the proximal end of the locking knob assembly and the locking bar extends distally from the locking knob to a distal end of the locking bar. As used herein, the terms "proximal" and "proximally," and "distal" and "distally" are relative to the position of the respective elements as the door lock mechanism is configured to be installed on a door, wherein "proximal" and "proximally" refer to being positioned relatively towards the interior side of the door lock mechanism and "distal" and "distally" refer to being positioned relatively towards the exterior side of the door lock mechanism. The locking knob extends proximally out of the inner handle, and the locking bar inserts into a cylinder of an inner handle. The locking bar has a longitudinal cross-hole having a cross-shaped cross-section forming two intersecting slots. The cross-hole has an open end at the distal end of the locking bar and is configured to receive a proximal portion of a locking lever (also called a bumper) in multiple orientations. The locking lever is a flat bar which can be inserted into the cross-hole of the locking bar in different orientations such that the locking lever inserts into either of the two intersecting slots formed by the cross-hole. In one aspect, the cross-hole is formed by two slots intersecting at a 90 degree angle, such that the locking lever may insert into the cross-hole in a first rotational orientation and a second rotational orientation rotated 90 degrees from the first rotational orientation.

A proximal end of the locking lever is coupled to a locking mechanism. The locking mechanism is configured to lock and unlock the outer handle and is actuated between a locked state and an unlocked state by rotation of the locking lever. The locking knob assembly and coupled locking lever are together rotatable between an unlocked position and a locked position which in turn actuates the locking mechanism between an unlocked state and a locked state. In the unlocked state, the locking mechanism enables the outer handle to retract the door latch bolt and in the

locked state the locked mechanism prevents the outer handle from retracting the door latch bolt.

The door lock mechanism also includes a guide sleeve disposed in the cylinder of the inner handle. The guide sleeve has a proximal tube portion which receives the distal end of the locking bar such that the open end of the cross-hole is within the proximal tube portion. The guide sleeve also has a distal tapered portion extending from a distal end of the proximal tube portion which tapers radially outward as the distal tapered portion extends distally. The guide sleeve functions as a guide to direct the locking lever into the cross-hole of the locking bar during assembly. For instance, when assembling the outer handle and spindle to the inner handle during installation of the door lock mechanism onto a door, if the locking lever is misaligned, slanted and/or tilted relative to the cross-hole in the locking bar, the guide sleeve directs the proximal end of the locking lever towards the cross-hole and aligns the locking lever with the cross-hole such that the locking lever can be easily and reliably inserted into the cross-hole during assembly, even during the blind assembly process.

In another aspect, the door lock mechanism further includes a guide sleeve stop disposed within the cylinder of the inner handle distal of the distal tapered portion of the guide sleeve. The guide sleeve stop is configured to hold the guide sleeve in place within the cylinder of the inner handle.

In still another aspect, the locking bar comprises a cylindrical body with the cross-hole extending longitudinally within the cylindrical body.

In yet another aspect, the locking mechanism is configured such that in the locked state the locking mechanism prevents the outer handle from being rotated to retract the door latch bolt, and in the unlocked state the locking mechanism allows the outer handle to be rotated to retract the door latch bolt.

In another aspect, the locking mechanism comprises a clutch mechanism that is configured such that in the locked state the outer handle is disengaged from the door latch bolt such that rotating the outer handle does not retract the door latch bolt, and in the unlocked state the outer handle is engaged to the door latch bolt such that rotating the outer handle retracts the door latch bolt.

In yet another aspect, the inner handle and outer handle each comprise a door knob.

In still another aspect, the inner handle and outer handle each comprise a door lever.

Another embodiment disclosed herein is a door lock mechanism kit comprising the components of any of the door lock mechanisms disclosed herein for assembly into a door lock mechanism. The components of the kit may comprise the elements of the door lock mechanism in any state of sub-assembly of the elements. For instance, in one example, a first component of the kit may comprise the outer handle, locking mechanism and lever assembled together and a second component of the kit may comprise the inner handle, locking knob assembly and guide sleeve.

Accordingly, improved door lock mechanisms are disclosed herein which overcome some of the drawbacks of previous devices. For example, the improved door lock mechanisms are not restricted to a single orientation of the locking knob, and also have a guide sleeve for aligning the locking lever to the cross-hole during assembly thereby allowing for easy and quick installation.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other aspects of embodiments are described in further detail with reference to the accompanying drawings, wherein like reference numerals refer to like elements and the description for like elements shall be applicable for all described embodiments wherever relevant. These drawings are not necessarily drawn to scale. In order to better appreciate how the above-recited and other advantages and objects are obtained, a more particular description of the disclosure will be rendered, which is illustrated in the accompanying drawings. These drawings depict only exemplary aspects of the disclosure for purposes of illustration and facilitating the below detailed description, and are not therefore to be considered limiting of its scope.

FIG. **1** is a side, perspective, partial cross-sectional view of a disassembled prior art door lock mechanism.

FIG. **2** is a side, perspective, partial cross-sectional view of the prior art door lock mechanism of FIG. **1** in an assembled configuration.

FIG. **3** is a side, perspective, partial cross-sectional view of the disassembled prior art door lock mechanism of FIG. **1** with the locking knob misaligned from the locking lever.

FIG. **4** is a side, perspective, partial cross-sectional view of the disassembled prior art door lock mechanism of FIG. **1** with the locking lever tilted relative to the locking knob during assembly.

FIG. **5** is a side, perspective, partial cross-sectional view of a disassembled door lock mechanism according to one embodiment disclosed herein.

FIG. **6** is a side, perspective view of the locking knob assembly of the door lock mechanism of FIG. **5**.

FIG. **7** is a side, perspective view of the guide sleeve of the door lock mechanism of FIG. **5**.

FIG. **8** is a side, perspective cross-sectional view of a door lock mechanism according to another embodiment disclosed herein.

FIG. **9** is a side, perspective cross-sectional view of a door lock mechanism according to yet another embodiment disclosed herein.

DETAILED DESCRIPTION

This specification describes exemplary embodiments, aspects and applications of the disclosure. The disclosure, however, is not limited to these exemplary embodiments, aspects and applications or to the manner in which the exemplary embodiments, aspects and applications operate or are described herein. Further, the figures may show simplified or partial views, and the dimensions of elements in the figures may be exaggerated or otherwise not in proportion. Moreover, elements of similar structures or functions are represented by like reference numerals throughout the figures. In addition, an illustrated aspect need not have all the features or advantages shown. A feature or an advantage described in conjunction with a particular aspect is not necessarily limited to that aspect, and can be practiced in any other aspect even if not so illustrated.

Referring to FIG. **5**, a door lock mechanism **100** according to one disclosed embodiment disclosed herein is illustrated. The door lock mechanism **100** includes an inner handle **102** and an outer handle **104**. The inner handle is **102** coupled to a door latch bolt (not shown) such that rotating the inner handle **102** retracts and extends the door latch bolt to unlatch and latch the door latch bolt to a mating strike plate (not shown) mounted on a door jamb. The outer handle **104** is also coupled to the door latch bolt such that rotating the outer handle **104** retracts and extends the door latch bolt to unlatch and latch the door latch bolt to the mating strike plate. As described in more detail below, the outer handle **104** may be releasably coupled to the door latch bolt and/or

lockable via a locking mechanism **132** to prevent the outer handle **104** from being able to retract the door latch bolt.

The inner handle **102** includes a proximal handle portion **108** connected to a cylinder **106** forming a cylindrical cavity which extends distally from the handle portion **108** along a longitudinal axis.

Referring to FIGS. **5** and **6**, the door lock mechanism **100** also includes a locking knob assembly **110**. The locking knob assembly **110** has a locking knob **112** on the proximal end of the locking knob assembly **110** and a locking bar **114** connected to the locking knob **112** extending distally from the locking knob **112**. The locking knob **114** is on the proximal end of the locking knob assembly **110** and the locking bar **114** extends distally from the locking knob **112** to a distal end **116** of the locking bar **114**. The locking knob **114** is accessible on the proximal side of the inner handle **108**, such as by extending proximally out of the inner handle **108**. The locking bar **114** inserts into the cylinder **106** of the inner handle **108**.

The locking bar **114** has a longitudinal cross-hole **118** extending along the longitudinal axis of the locking bar **114**. The cross-hole **118** has a cross-shaped cross-section forming two intersecting slots **120**, **122** slots which intersect at a 90 degree angle (i.e., orthogonal to each other). Alternatively, the intersecting slots **120**, **122** may intersect at any other suitable angle, such as a 60 degree angle, or 45 degree angle, etc. In the rotational position of the locking bar **114** as shown in FIGS. **5** and **6**, the first slot **120** is horizontal and the second slot **122** is vertical. The cross-hole **118** has an open end at the distal end **116** of the locking bar **114**. The cross-hole **118** of the locking bar **114** is configured to receive a proximal portion **126** of a locking lever **124** (also called a bumper **124**). The locking lever **124** is a flat bar. Accordingly, the cooperating configurations of the locking lever **124** and cross-hole **118** allow the locking lever **124** to be inserted into the cross-hole **118** of the locking bar **114** in different orientations such that the locking lever inserts into either of the two intersecting slots **120**, **122** formed by the cross-hole **118**. In other words, the locking lever **124** can be inserted into the first slot **120** of the cross-hole **118** in a first rotational orientation (the locking lever **124** is horizontal when inserted into the first slot **120** in the arrangement of the door lock mechanism **100** in FIG. **5**), or the locking lever **124** can be inserted into the second slot **122** in a second rotation orientation (the locking lever **124** is vertical (i.e., rotated 90 degrees from the first rotational orientation) when inserted into the second slot **122** in the arrangement of the door lock mechanism **100** in FIG. **5**).

The locking lever **124** has a proximal end **128** which is coupled to a locking mechanism **132**. The locking mechanism **132** is configured to lock and unlock the outer handle **104** and is actuated by the locking lever **124** between a locked state and an unlocked state by rotation of the locking lever **124**. In the unlocked state, the locking mechanism **132** enables the outer handle **104** to retract the door latch bolt and in the locked state the locked mechanism **132** prevents the outer handle **104** from retracting the door latch bolt. The locking bar **114** of the locking knob assembly **132** and locking lever **124** are coupled together via the cross-hole **118** and are together rotatable between an unlocked position which actuates the locking mechanism **132** to the unlocked state, and a locked position which actuates the locking mechanism **132** to the unlocked state. The locking knob **112** of the locking knob assembly **110** can be manually rotated by a user to rotate the locking lever **124** between the unlocked position and the locked position to actuate the locking mechanism **132** between the unlocked state and the locked state, respectively.

The locking mechanism **132** may be any suitable locking mechanism for unlocking and locking the door lock mechanism **100** to enable and disable the outer handle **104** to retract the door latch bolt. For example, in one embodiment, the locking mechanism **132** is configured such that in the locked state the locking mechanism **132** prevents the outer handle **104** from being rotated to retract the door latch bolt, and in the unlocked state the locking mechanism **132** allows the outer handle to be rotated to retract the door latch bolt. In another embodiment, the locking mechanism **132** comprises a clutch mechanism that is configured such that in the locked state the outer handle **104** is disengaged from the door latch bolt such that rotating the outer handle does not retract the door latch bolt, and in the unlocked state the outer handle **104** is engaged to the door latch bolt such that rotating the outer handle **104** retracts the door latch bolt.

Referring to FIGS. **5** and **7**, the door lock mechanism **100** also has guide sleeve **134** for guiding the locking lever **124** into the cross-hole **118** during assembly of the door lock mechanism **100**. The guide sleeve **134** is disposed longitudinally within the cylinder **106** of the inner handle **102**. The guide sleeve **134** comprises a proximal tube portion **136** having an open proximal end **142** and a distal end **140**. The proximal tube portion **136** receives the distal end **116** of the locking bar **114** such that the open end of the cross-hole **118** is received within the proximal tube portion **136**. In other words, the locking bar **114** inserts into the proximal tube portion **136** of the guide sleeve **134**. The distal end **116** of the locking bar **114** is proximal of the distal end of the proximal tube portion **136** such that the locking bar **114** does not extend distally past the distal end of the proximal tube portion **136**. The guide sleeve **134** also has a distal tapered portion **138** extending from a distal end **140** of the proximal tube portion **136**. The distal tapered portion **138** has a proximal end **144** having an inner diameter substantially the same as an inner diameter of the proximal tube portion **136**. The distal tapered portion **138** tapers radially outward from the proximal end **144** as the distal tapered portion **138** extends distally to a distal end **146** which has an inner diameter that is larger than the inner diameter of the proximal end **144**. The door lock mechanism **100** also includes a guide sleeve stop **148** disposed within the cylinder **106** of the inner handle **102**. The guide sleeve stop **148** is positioned just distal of the distal end **146** of the distal tapered portion **138** and is fixed to the cylinder **106**. The guide sleeve stop **148** is configured to hold the guide sleeve **134** in place within the cylinder **106** of the inner handle **102**.

Accordingly, during installation and/or assembly of the door lock mechanism **100**, the guide sleeve **134** functions to guide the locking lever **124** into the cross-hole **118** of the locking bar **114**. As an example, when assembling the outer handle **104** and spindle **146** to the inner handle **102** during installation of the door lock mechanism **100** onto a door, at the point that the locking lever **124** is approaching the cross-hole **118**, the assembly of the locking lever **124** to the cross-hole **118** is blind because the person installing the door lock mechanism cannot see into cylinder **106**. If the locking lever **124** is misaligned, slanted and/or tilted relative to the cross-hole **118**, proximal portion **126** of the locking lever **124** will bear against the distal tapered portion **138** which will direct the proximal portion **126** of the locking lever towards the cross-hole **118** as it is moved proximally toward the cross-hole **118**, thereby aligning the proximal portion **126** of the locking lever **124** with the cross-hole **118** until the

proximal portion **126** inserts into the cross-hole **118**. The locking lever **124** is then advanced proximally through the proximal tube portion **136** and into the cross-hole **118** until it is fully inserted into the cross-hole **118**. Thus, the guide sleeve **134** allows the locking lever **124** to be easily and reliably inserted into the cross-hole **118** during assembly, even during the blind assembly process.

Referring now to FIG. **8**, a door lock mechanism **200** according to another embodiment disclosed herein is illustrated. The door lock mechanism **200** is the same as the door lock mechanism **100**, except that in door lock mechanism **200** the inner handle comprises a door knob **202** and the outer handle comprises a door knob **204**.

Turning to FIG. **9**, a door lock mechanism **300** according to yet another embodiment disclosed herein is illustrated. The door lock mechanism **300** is the same as the door lock mechanisms **100** and **200**, except that in door lock mechanism **300** the inner handle comprises a door lever **302** and the outer handle comprises a door lever **304**.

In another aspect, the door lock mechanisms **100**, **200** and **300**, as shown in FIGS. **5-9**, comprise door lock mechanism kits which are configured to be assembled and installed on a door. As shown in FIGS. **5**, **8**, and **9**, the proximal side of the door lock mechanisms **100**, **200** and **300** comprise a first kit component, and the distal side of the door lock mechanisms **100**, **200** and **300**, comprise a second kit component. The first kit component and second kit component can be assembled together and installed on a door, as described herein.

Although particular embodiments have been shown and described, it is to be understood that the above description is not intended to limit the scope of these embodiments. While embodiments and variations of the many aspects of the invention have been disclosed and described herein, such disclosure is provided for purposes of explanation and illustration only. Thus, various changes and modifications may be made without departing from the scope of the claims. For example, not all of the components described in the embodiments are necessary, and the invention may include any suitable combinations of the described components, and the general shapes and relative sizes of the components of the invention may be modified. Accordingly, embodiments are intended to exemplify alternatives, modifications, and equivalents that may fall within the scope of the claims. The invention, therefore, should not be limited, except to the following claims, and their equivalents.

What is claimed is:

1. A door lock mechanism, comprising:

an outer handle operably coupled to a door latch bolt such that rotating the outer handle retracts the door latch bolt;

an inner handle operably coupled to the door latch bolt such that rotating the inner handle retracts the door latch bolt, the inner handle comprising a handle portion connected to a cylinder, the cylinder forming a cylindrical cavity which extends distally from the handle portion along a longitudinal axis;

a locking knob assembly comprising a locking knob connected to a locking bar, the locking knob forming a proximal end of the locking knob assembly and the locking bar extending distally from the locking knob to a distal end of the locking bar; the locking bar having a longitudinal cross-hole having a cross-shaped cross-section forming two intersecting slots such that the cross-hole can receive a locking lever in one of the intersecting slots in a first rotational orientation and the cross-hole can receive the locking lever in the other one of the intersecting slots in a second rotational orientation different than the first rotational orientation, the cross-hole having open end at the distal end of the locking bar, the locking bar rotatably received in the cylinder of the inner handle;

the locking lever comprising a flat bar having a proximal portion and a distal portion, the proximal portion of the locking lever inserted into either one of the two intersecting slots of the cross-hole, the distal portion of the locking lever operably coupled to a locking mechanism,

the locking mechanism configured to be actuated between a locked state and an unlocked state by rotation of the locking lever which is rotatable by rotation of the locking knob, wherein in the locked state the locking mechanism prevents the outer handle from retracting the door latch bolt and in the unlocked state the locking mechanism enables the outer handle to retract the door latch bolt;

a guide sleeve disposed in the cylinder of the inner handle, the guide sleeve having a proximal tube portion and a distal tapered portion, the distal tapered portion extending distally from a distal end of the proximal tube portion and tapering radially outward as the distal tapered portion extends distally, the guide sleeve receiving the distal end of the locking bar such that the open end of the cross-hole is within the proximal tube portion, wherein the guide sleeve functions as a guide to direct the locking lever into the cross-hole of the locking bar during assembly of the door lock mechanism.

2. The door lock mechanism of claim **1**, further comprising:

a guide sleeve stop disposed within the cylinder of the inner handle distal of the distal tapered portion of the guide sleeve, the guide sleeve stop configured to retain the guide sleeve in place within the cylinder of the inner handle.

3. The door lock mechanism of claim **1**, wherein the locking bar comprises a cylindrical body with the cross-hole extending longitudinally within the cylindrical body.

4. The door lock mechanism of claim **1**, wherein the locking mechanism is configured such that in the locked state the locking mechanism prevents the outer handle from being rotated to retract the door latch bolt, and in the unlocked state the locking mechanism allows the outer handle to be rotated to retract the door latch bolt.

5. The door lock mechanism of claim **1**, wherein the locking mechanism comprises a clutch mechanism that is configured such that in the locked state the outer handle is disengaged from the door latch bolt such that rotating the outer handle does not retract the door latch bolt, and in the unlocked state the outer handle is engaged to the door latch bolt such that rotating the outer handle retracts the door latch bolt.

6. The door lock mechanism of claim **1**, wherein the inner handle comprises a first door knob and the outer handle comprises a second door knob.

7. The door lock mechanism of claim **1**, wherein the inner handle comprises a first door lever and outer handle comprises a second door lever.

8. The door lock mechanism of claim **1**, wherein two slots of the cross-hole intersect at a 90 degree angle, such that the second rotational orientation is rotated 90 degrees from the first rotational orientation.

9. A door lock mechanism kit configured to be assembled and installed on a door, comprising:

an outer handle operably coupled configured to be attached to a door latch bolt such that rotating the outer handle retracts the door latch bolt;

an inner handle configured to be operably coupled to the door latch bolt such that rotating the inner handle retracts the door latch bolt, the inner handle comprising a handle portion connected to a cylinder, the cylinder forming a cylindrical cavity which extends distally from the handle portion along a longitudinal axis;

a locking knob assembly comprising a locking knob connected to a locking bar, the locking knob forming a proximal end of the locking knob assembly and the locking bar extending distally from the locking knob to a distal end of the locking bar; the locking bar having a longitudinal cross-hole having a cross-shaped cross-section forming two intersecting slots such that the cross-hole is configured to receive a locking lever in one of the intersecting slots in a first rotational orientation and the cross-hole is configured to receive the locking lever in the other one of the intersecting slots in a second rotational orientation different than the first rotational orientation, the cross-hole having open end at the distal end of the locking bar, the locking bar rotatably received in the cylinder of the inner handle;

the locking lever comprising a flat bar having a proximal portion and a distal portion, the proximal portion of the locking lever configured to be inserted into either one of the two intersecting slots of the cross-hole, the distal portion of the locking lever configured to be operably coupled to a locking mechanism,

the locking mechanism configured to be actuated between a locked state and an unlocked state by rotation of the locking lever which is rotatable by rotation of the locking knob, wherein in the locked state the locking mechanism prevents the outer handle from retracting the door latch bolt and in the unlocked state the locking mechanism enables the outer handle to retract the door latch bolt;

a guide sleeve disposed in the cylinder of the inner handle, the guide sleeve having a proximal tube portion and a distal tapered portion, the distal tapered portion extending distally from a distal end of the proximal tube portion and tapering radially outward as the distal tapered portion extends distally, the guide sleeve receiving the distal end of the locking bar such that the open end of the cross-hole is within the proximal tube portion, wherein the guide sleeve functions as a guide to direct the locking lever into the cross-hole of the locking bar during assembly of the door lock mechanism.

10. The door lock mechanism kit of claim **9**, further comprising:

a guide sleeve stop disposed within the cylinder of the inner handle distal of the distal tapered portion of the guide sleeve, the guide sleeve stop configured to retain the guide sleeve in place within the cylinder of the inner handle.

11. The door lock mechanism kit of claim **9**, wherein the locking bar comprises a cylindrical body with the cross-hole extending longitudinally within the cylindrical body.

12. The door lock mechanism kit of claim **9**, wherein the locking mechanism is configured such that in the locked state the locking mechanism prevents the outer handle from being rotated to retract the door latch bolt, and in the unlocked state the locking mechanism allows the outer handle to be rotated to retract the door latch bolt.

13. The door lock mechanism kit of claim **9**, wherein the locking mechanism comprises a clutch mechanism that is configured such that in the locked state the outer handle is disengaged from the door latch bolt such that rotating the outer handle does not retract the door latch bolt, and in the unlocked state the outer handle is engaged to the door latch bolt such that rotating the outer handle retracts the door latch bolt.

14. The door lock mechanism kit of claim **9**, wherein the inner handle comprises a first door knob and the outer handle comprises a second door knob.

15. The door lock mechanism kit of claim **9**, wherein the inner handle comprises a first door lever and outer handle comprises a second door lever.

16. The door lock mechanism kit of claim **9**, wherein two slots of the cross-hole intersect at a 90 degree angle, such that the second rotational orientation is rotated 90 degrees from the first rotational orientation.

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