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(54) **SIMPLIFIED LEVER HANDING APPARATUS**

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E05B 63/04 (2006.01)
E05B 3/06 (2006.01)
E05B 47/00 (2006.01)

(52) **U.S. Cl.**
CPC ***E05B 63/04*** (2013.01); ***E05B 3/065*** (2013.01); *E05B 2047/0058* (2013.01); *Y10T 292/57* (2015.04)

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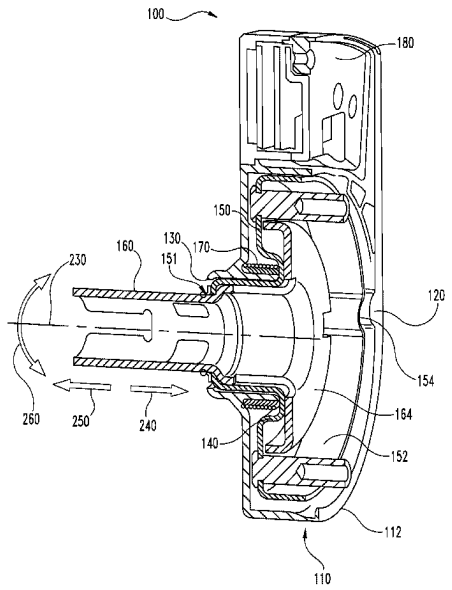
(57) **ABSTRACT**

The present disclosure defines a lever handing apparatus that permits simplified changing of the handing of a lever handle between a left hand and a right hand orientation. The lever handing apparatus includes an assembly with a rotatable spring cage housing and lever spindle that can be selectively rotated within an escutcheon housing to change the handing position of a lever arm. The handing orientation of the lever can be repositioned without removing a back plate or accessing internal components positioned within the escutcheon housing assembly.

19 Claims, 9 Drawing Sheets



Related U.S. Application Data

division of application No. 14/189,228, filed on Feb. 25, 2014, now Pat. No. 9,790,713.

(58) **Field of Classification Search**

CPC . Y10T 292/876; Y10T 292/88; Y10T 292/91; Y10T 292/93; Y10T 292/96; Y10T 292/1097; Y10T 292/1098; Y10T 292/59; Y10T 70/5832; Y10T 70/8838; Y10T 70/8865; Y10S 292/52; Y10S 292/53; Y10S 292/60

See application file for complete search history.

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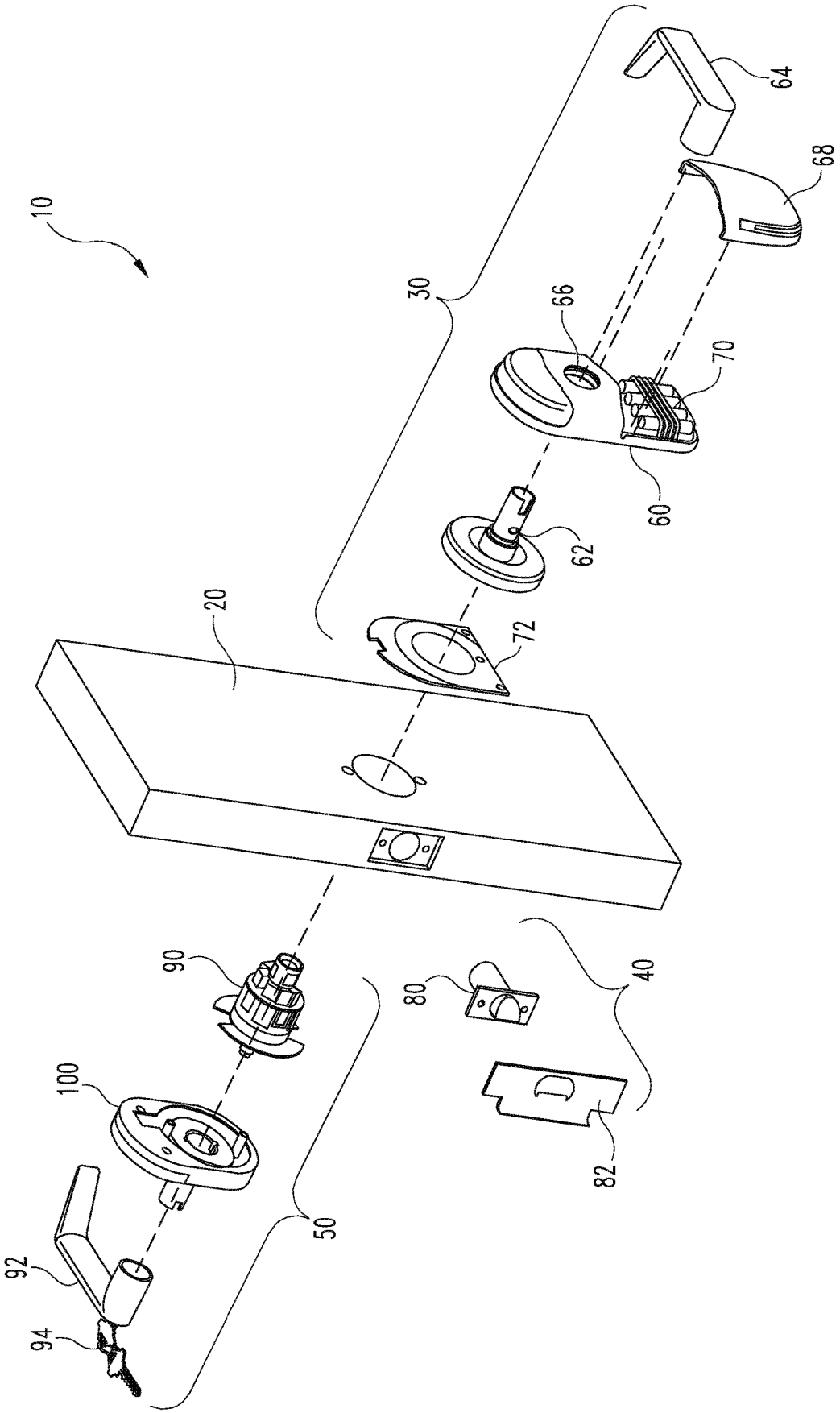
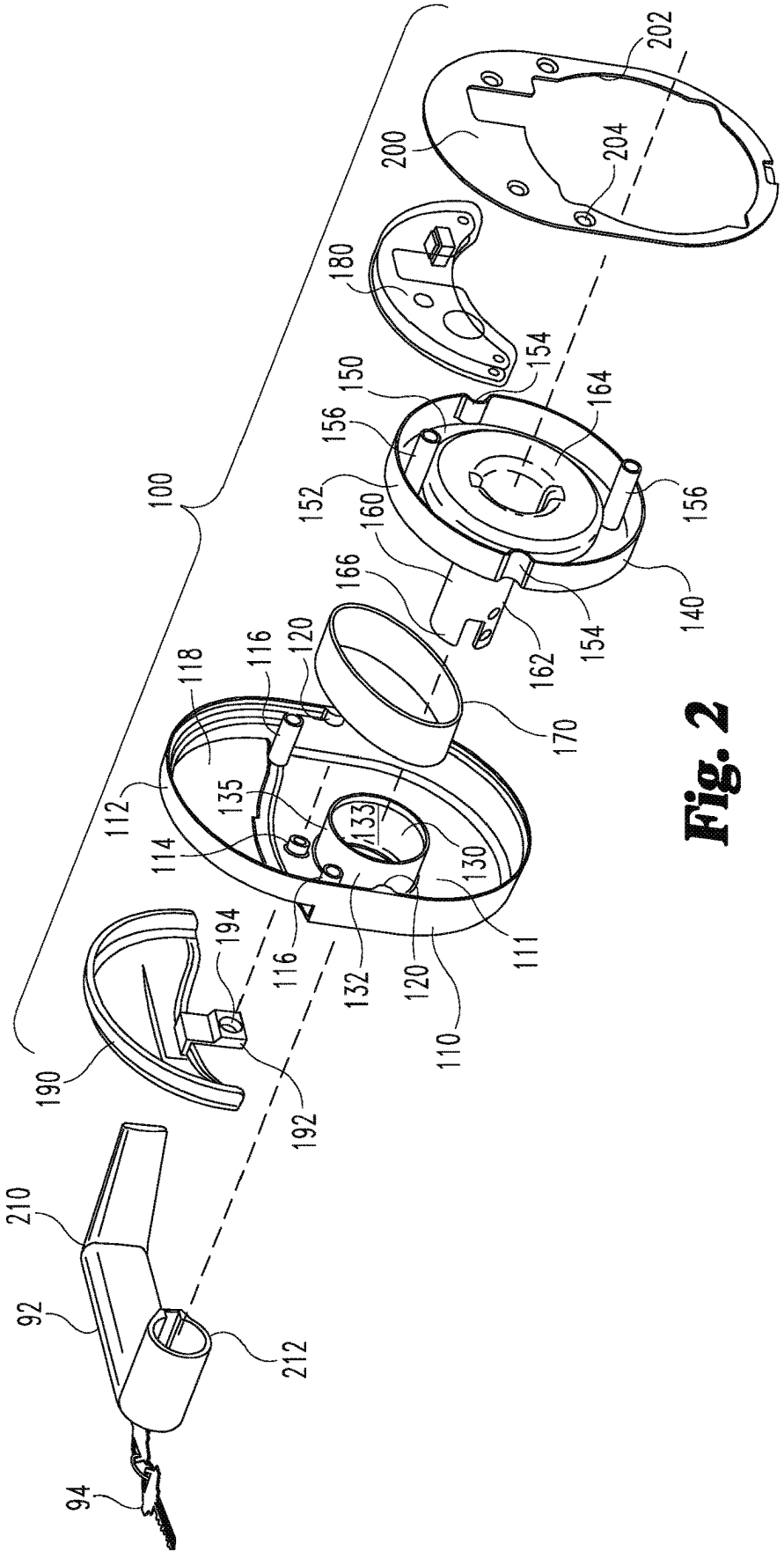


Fig. 1


100
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120
116
118
170
112
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130
111
194
116
132
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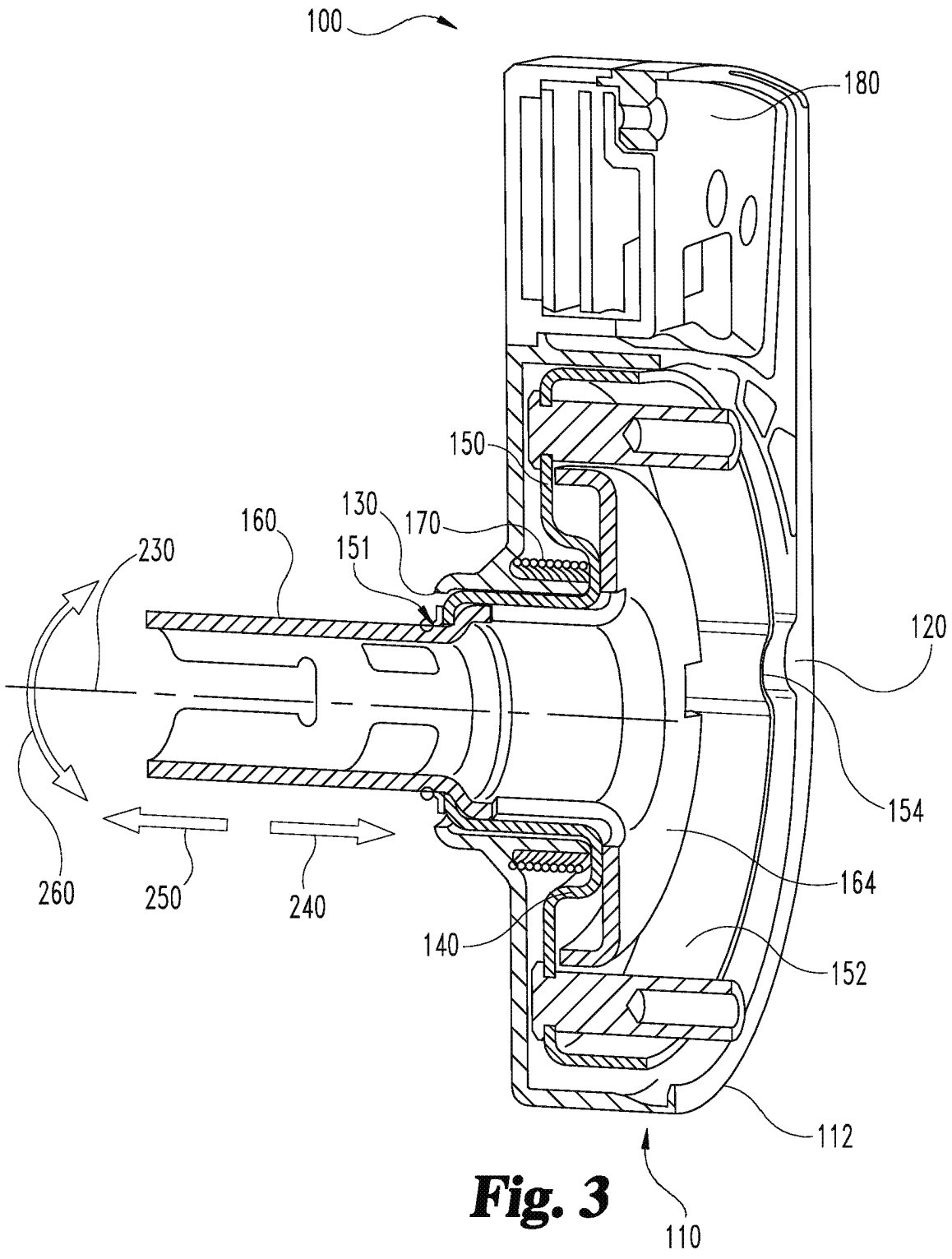
110
190
192
210
92
212
94

Fig. 2


100
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164
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Fig. 3

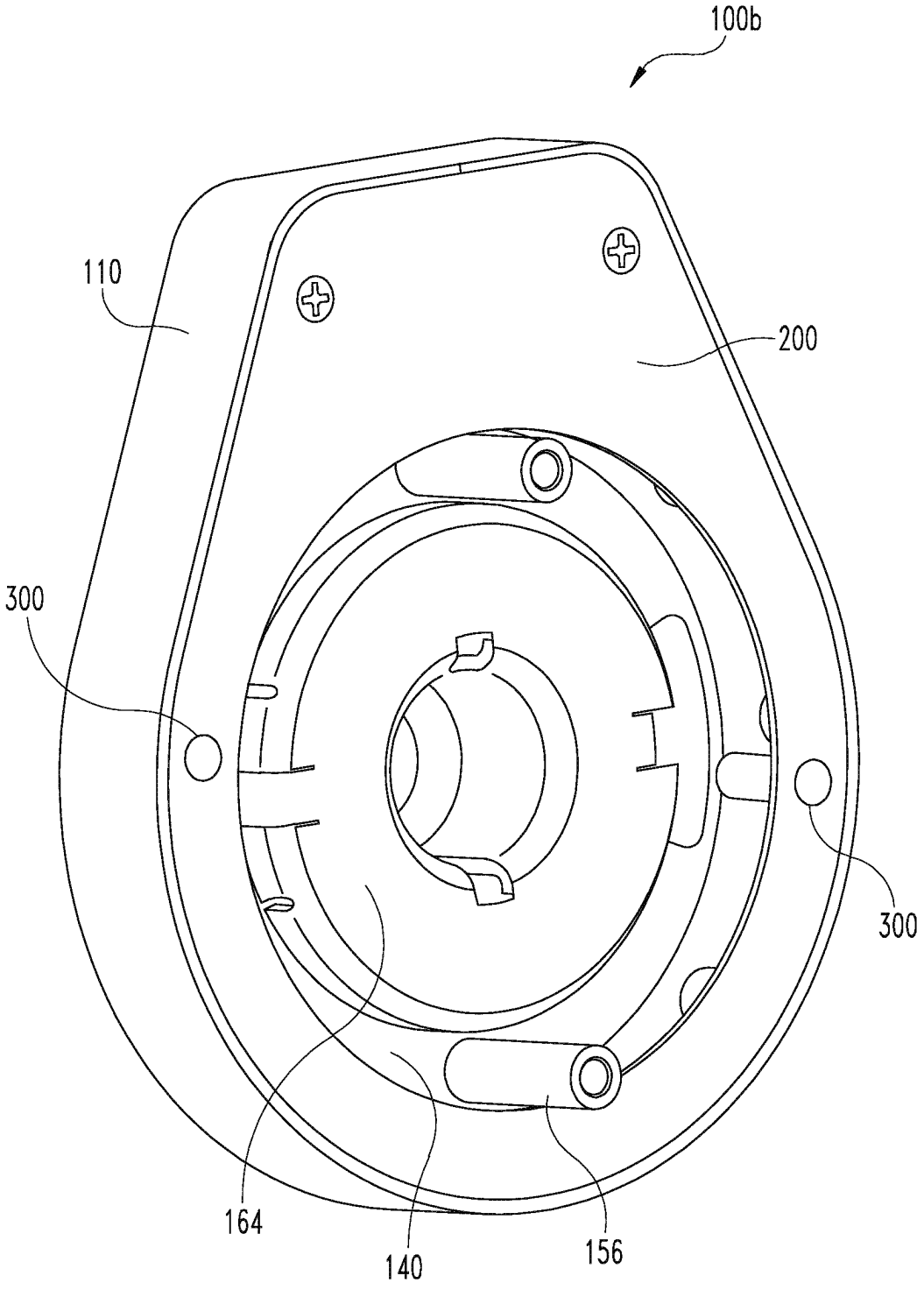

Fig. 4

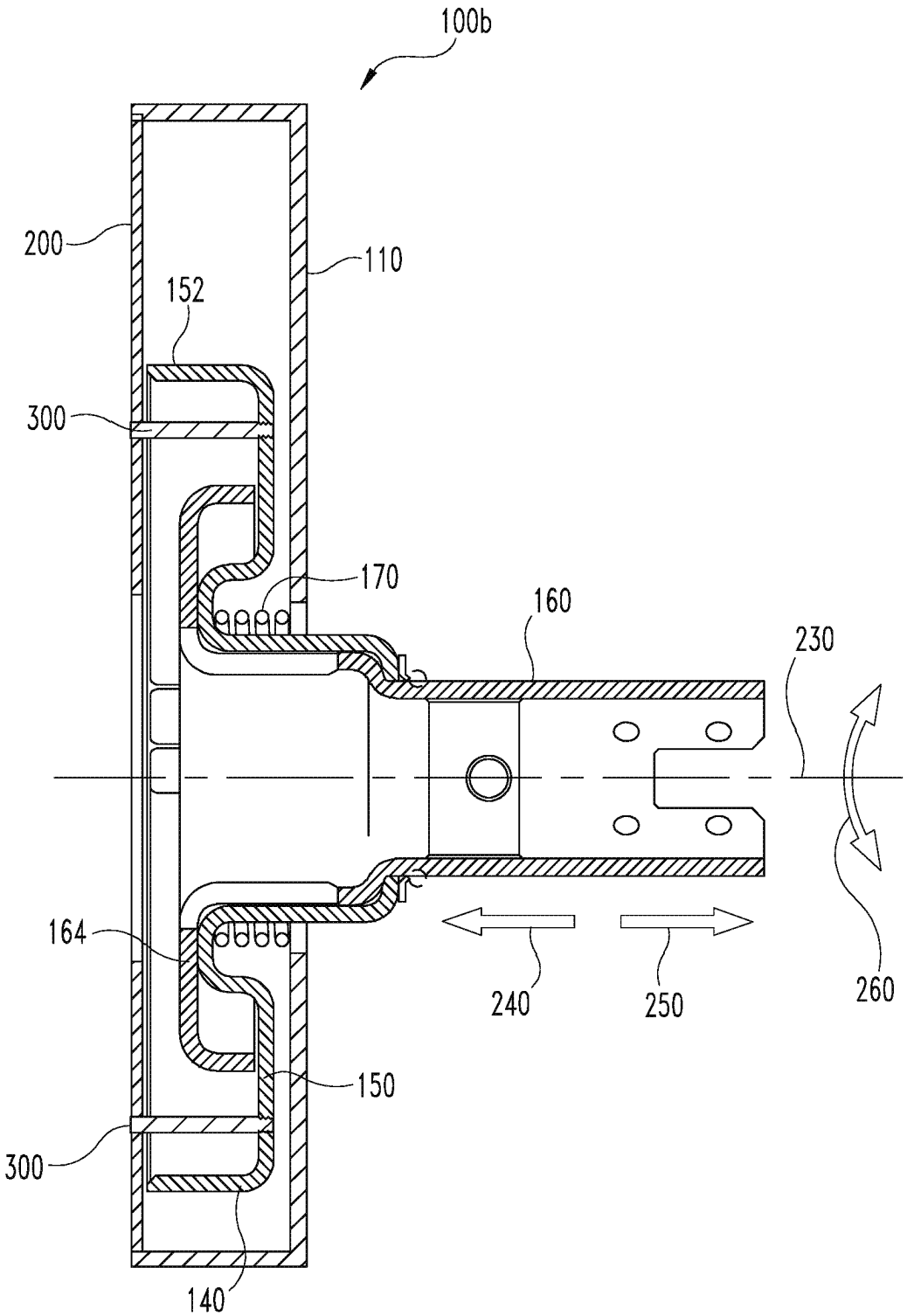

Fig. 5

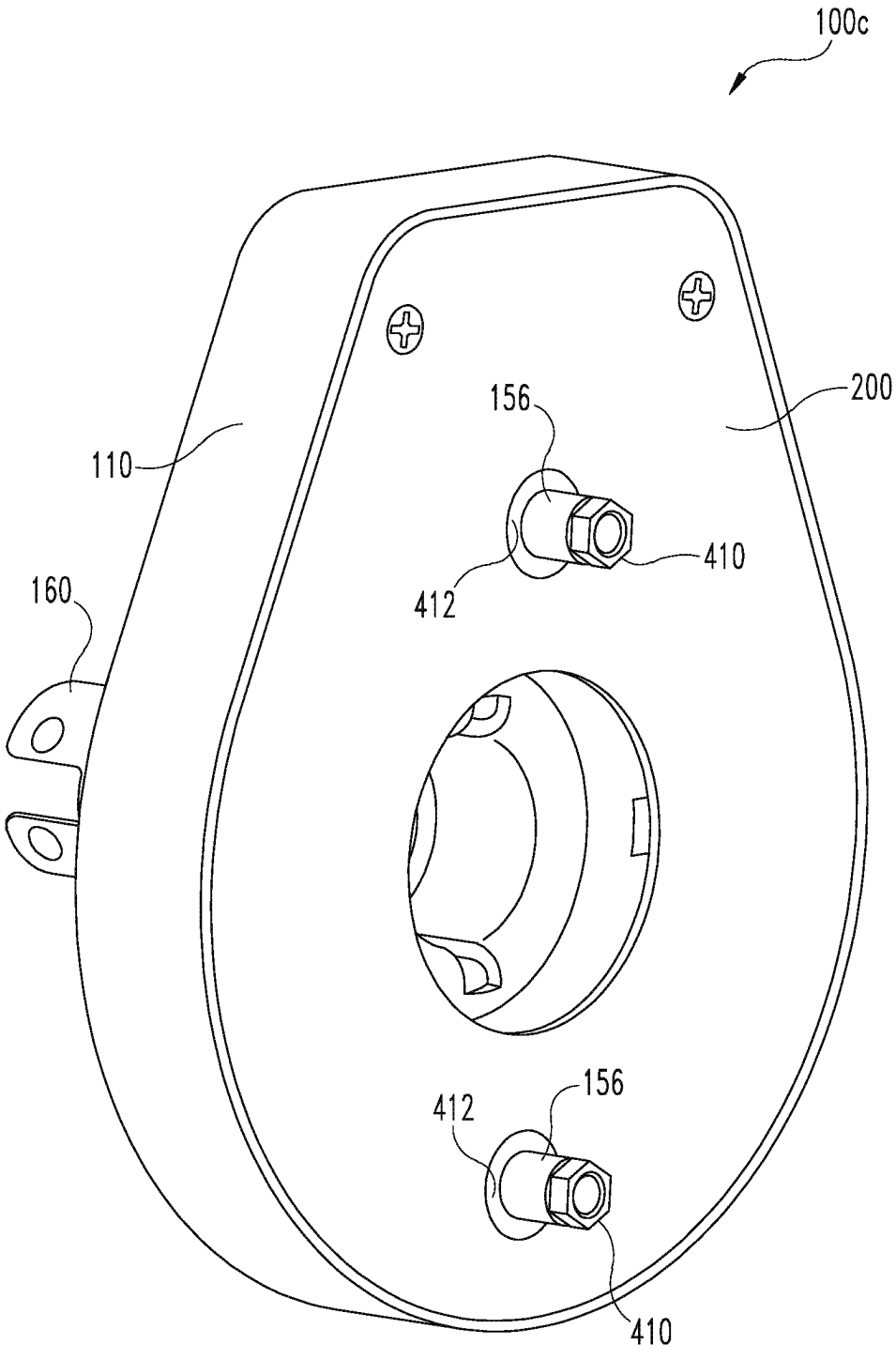

Fig. 6

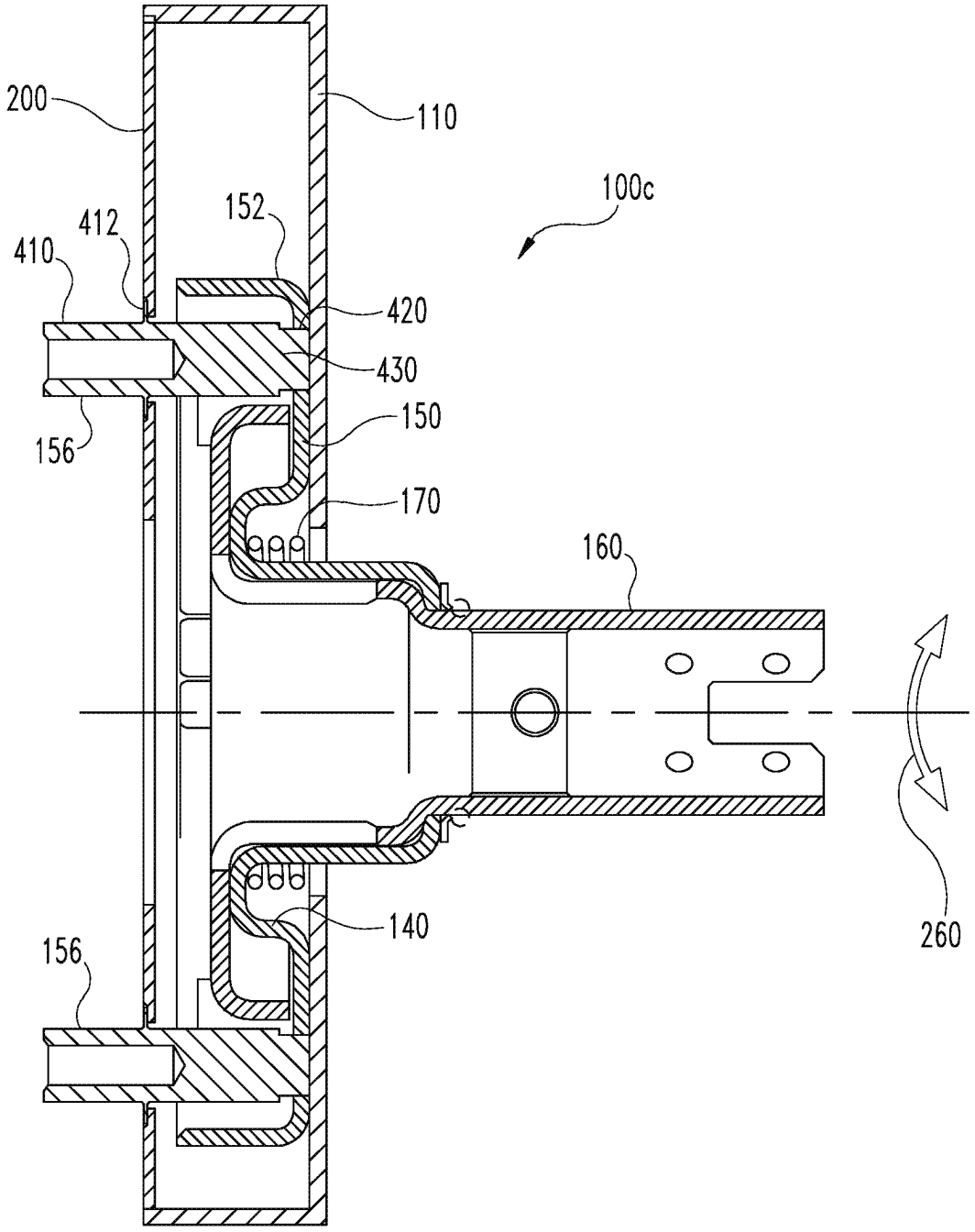

Fig. 7

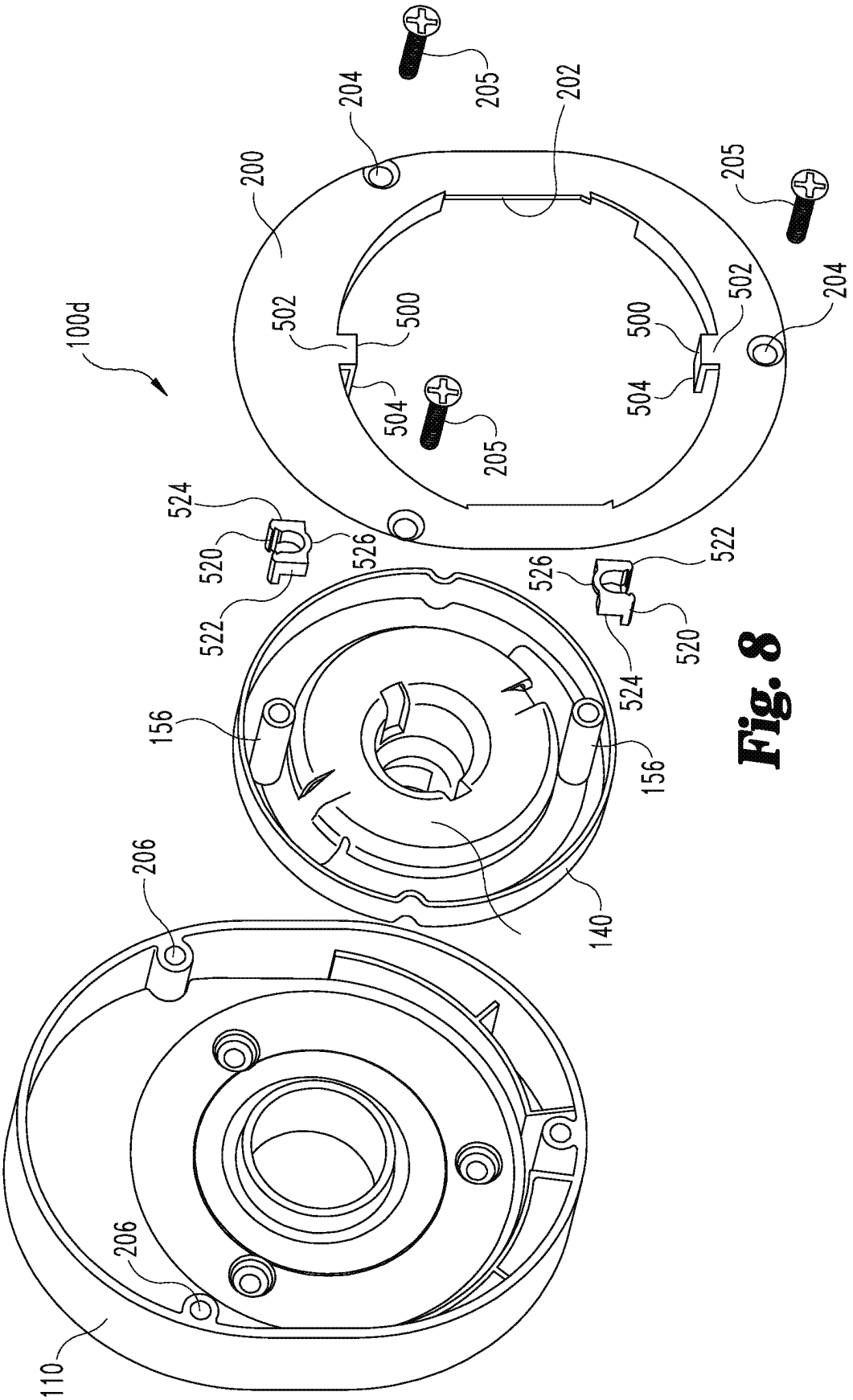

Fig. 8

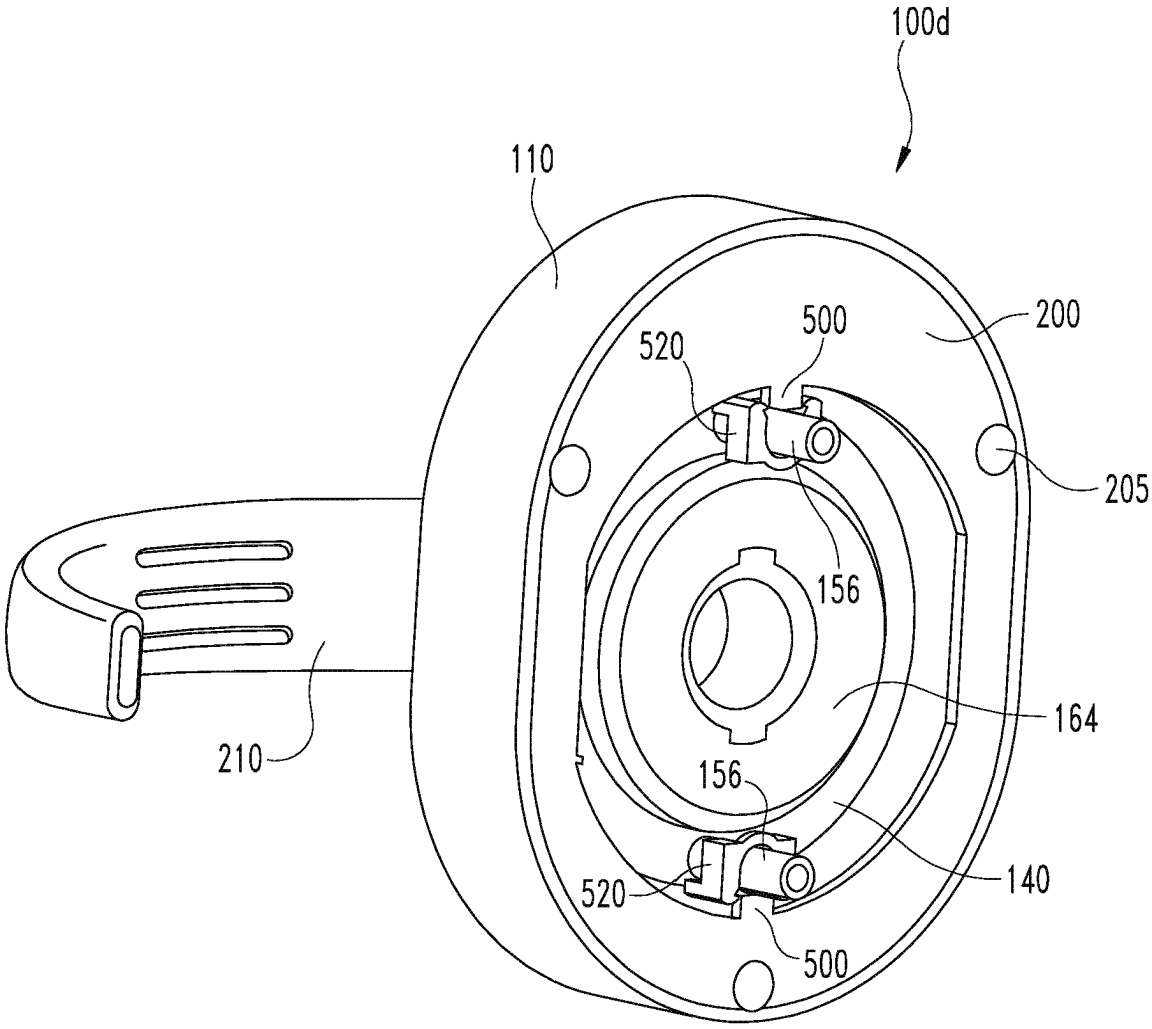

Fig. 9

SIMPLIFIED LEVER HANDING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of U.S. patent application Ser. No. 15/730,938 filed Oct. 12, 2017 and issued as U.S. Pat. No. 10,954,694, which is a divisional of U.S. patent application Ser. No. 14/189,228 filed Feb. 25, 2014 and issued as U.S. Pat. No. 9,790,713, the contents of each application hereby incorporated by reference in their entirety.

TECHNICAL FIELD

The present disclosure generally relates to a lever handing apparatus for a lever handle connected to a lock and escutcheon assembly, and more specifically to a lever handing apparatus configured to permit selectively pivoting of the lever handle for operation with either a left handed or right handed opening door.

BACKGROUND

Lever handles for lock and escutcheon assemblies can be repositionable approximately 180 degrees apart depending on whether the handle will be used on a door that opens from the left hand side or a door that opens from the right hand side. Typically lever handles are changed between right hand and left hand orientations by removing and reorienting portions of a handle assembly and/or opening the escutcheon trim assembly to gain access to adjustable internal components. This can be both time consuming and cumbersome for the lock installer. Accordingly there remains a need for further contributions in this area of technology.

SUMMARY

One embodiment of the present disclosure includes a lever handing apparatus for changing the handing of a lever handle connected with a lock and escutcheon assembly to selectively operate with either right hand or left hand opening doors. Other embodiments include apparatuses, systems, devices, hardware, methods, and combinations for the same. Further embodiments, forms, features, aspects, benefits, and advantages of the present application shall become apparent from the description and figures provided herewith.

BRIEF DESCRIPTION OF THE FIGURES

The description herein makes reference to the accompanying drawings wherein like reference numerals refer to like parts throughout the several views, and wherein:

FIG. **1** is an exploded view of a lock and handle assembly according to one embodiment of the present disclosure;

FIG. **2** is a perspective exploded view of a lever handing apparatus according to one embodiment of the present disclosure;

FIG. **3** is a cross-sectional cutaway view of the lever handing apparatus of FIG. **2**;

FIG. **4** is an aft perspective view of another embodiment of a lever handing apparatus according to the present disclosure;

FIG. **5** is a cross-sectional cutaway view the lever handing apparatus of FIG. **4**;

FIG. **6** is an aft perspective view of yet another embodiment of a lever handing apparatus according to the present disclosure;

FIG. **7** is a cross-sectional cutaway view of the lever handing apparatus of FIG. **6**;

FIG. **8** is an exploded perspective view of yet another embodiment of the lever handing apparatus according to the present disclosure; and

FIG. **9** is an aft perspective view of the lever handing apparatus of FIG. **8** in an assembled configuration.

DETAILED DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

For purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring now to FIG. **1**, a lock assembly **10** according to the present disclosure is illustrated therein. The lock assembly **10** can be configured for a door **20** or similar moveable structures that are selectively locked to fixed structures. The lock assembly **10** can include an inner trim assembly **30**, a latch assembly **40**, and an outer trim assembly **50**. The inner trim assembly **30** can include an inner escutcheon housing **60** and an inner lever spindle **62** rotatably connected therewith. An inner lever or handle **64** can be connected to the inner lever spindle **62** extending through an aperture **66** formed through the inner escutcheon housing **60**. A removable cover **68** can be employed to selectively cover electronic components such as batteries **70** and the like for electronic lock mechanisms. An inner back plate **72** can be releasably connected to the inner escutcheon housing **60** to hold the inner level spindle **62** and other components within the inner escutcheon housing **60**. The latch assembly **40** can include one or more latches **80** and a latch plate **82** connected to fixed structure (not shown).

The outer trim assembly **50** can include a lock mechanism **90** that is operable to lock and unlock the door **20**. An outer lever **92** can be connected to a lever handing apparatus **100** to permit handing changes for left and right handed opening door. The handing apparatus **100** can be operably connected to the locking mechanism **90**, the latch assembly **40** and the inner trim assembly **30**. The locking mechanism **90** can include mechanical locking mechanisms as well as electronic mechanisms including electronic controllers as is known to those skilled in the art. A manual override mechanism can include a key **94** to unlock the lock mechanism **10** as is conventional. Material selection for components in the lock assembly **10** can include metals, plastics, composites and combinations thereof to meet design criteria for a particular application.

Referring now to FIG. **2**, the lever handing apparatus **100** is shown in an exploded view. The lever handing apparatus **100** includes an outer escutcheon housing **110** that includes a front wall **111** extending to an outer rim **112** position substantially around the front wall **111**. In the illustrative embodiment, the outer rim is formed in a substantially ovalized shape to correspond with a configuration of the escutcheon housing **110**, however alternate shapes or configurations are also contemplated by the present disclosure.

The front wall **111** can include a threaded receiver **114** connected thereto to receive a threaded fastener (not shown). One or more threaded posts **116** can also be formed with or connected to the outer escutcheon housing **110**. Both the threaded receiver **114** and the threaded posts **116** will be discussed in further detail below. A PCB (Printed Circuit Board) holding region **118** can be positioned within the outer escutcheon housing **110** in some embodiments having electronic lock mechanisms. In the other embodiments the lever handing apparatus **100** may not include a PCB holding region **118**.

One or more abutments such as protruding portions or dimples **120** can be formed on the outer rim **112** of the escutcheon housing **110** that protrude radially inward from the outer rim **112** and can be positioned approximately 180 degrees apart from one another. The dimples or protrusions **120** are configured to permit selective change of orientation of the outer lever **92** between left hand and right hand opening doors. A spindle aperture **130** having a substantially circular shape can be formed through the front wall **111** of the outer escutcheon housing **110**. The spindle aperture **130** can include a spindle support wall **132** having an inner surface and an outer surface **133**, **135** respectively that extends inward from the front wall **111**.

A spring cage housing **140** can include a spring cage wall **150** extending radially outward to a spring cage outer rim **152**. The spring cage rim **152** can include one or more recessed portions **154** that are complementary with the one or more dimples **120** formed in the outer escutcheon housing **110**. The recessed portions **154** of the spring cage rim **152** are complimentary to the dimples **120** of the outer escutcheon housing **110** in that a recessed portion **154** can be nested in a first axial position with a corresponding dimple **120** when each pair are circumferential alignment. In the first axial position, the dimple **120** will prevent the spring cage housing **140** from rotating relative to the outer escutcheon housing **110**. When the recessed portion **154** is moved to a second axial position that is not axially aligned (i.e. unnested) the spring cage housing **140** can be rotated relative to the outer escutcheon housing **110** and thus permit a change of orientation of the outer lever **92** as will be explained in more detail below.

The spring cage housing **140** can also include one or more optional posts **156** that extend from the spring cage wall **150**. In some embodiments the optional posts **156** can be eliminated from the assembly. A lever spindle **160** can be rotatably coupled with the spring cage housing **140** such that in one configuration the lever spindle **160** and the spring cage housing **140** rotate together and in another configuration the lever spindle **160** can rotate independently of the spring cage housing **140**. A shaft **162** extending from a body portion **164** of the lever spindle **160** can be inserted through an aperture **151** (see FIG. **3**) formed through the spring cage wall **150** of the spring cage housing **140**. The lever spindle shaft **162** includes a lever connecting portion **166** on one end thereof to connect with the outer lever **92** such that rotation of the outer lever **92** causes rotation of the lever spindle shaft **162**. In one form the lever spindle **162** can be rotatably coupled to the spring cage housing **140** such that through mechanical connection the lever spindle **160** can freely rotate relative to the spring cage housing **140** when the coupled pair are in a first axial position and can rotate together when the coupled pair are in a second axial position.

A resilient member such as a handing spring **170** can be positioned about the spindle support wall **132** of the outer escutcheon housing **110** and can engage with the spring cage housing **140** so as to urge separation between the front wall **111** of the outer escutcheon housing **110** and the spring cage housing **140**. The handing spring **170** can be defined by any resilient member or configuration as desired, such as leaf springs or others known to those skilled in the art, but in the exemplary embodiment a coil spring is depicted for illustrative purposes. The handing spring **170** is operable to urge the spring cage housing toward the first axial position such that the spring cage housing **140** is circumferentially locked (non-rotatable) with respect to the outer escutcheon housing **110**.

A PCB assembly **180** that includes electronic circuits and components for electronic locks can be positioned within the PCB holding region **118** of the outer escutcheon housing **110**. An RF (Radio Frequency) window cover **190** can be used to cover the PCB holding region **118** on one side of the outer escutcheon housing **110**. The RF window is operable to permit RF signals to be transmitted from a transmitter such as a proximity card and the like through the RF window cover to a receiver (not illustrated) connected with the PCB assembly **180**. The RF window cover **190** can include a connector tab **192** with a through hole **194** configured to engage with the threaded receiver **114** of the outer escutcheon housing **110**. A threaded fastener (not shown) can be used to selectively couple the RF window cover **190** to the outer escutcheon housing **110** as is conventional.

A back plate **200** can be connected to the outer escutcheon housing **110** through one or more threaded fasteners, clips, or other mechanical connections that although not shown are well known to those skilled in the art. The back plate **200** is configured to enclose the spring cage housing **140**, lever spindle **160**, the handing spring **170** as well as other components within the outer escutcheon housing **110**. The back plate **200** can include an opening with an inner boundary **202** in some embodiments to permit access to components enclosed by the outer escutcheon housing **110**. In other embodiments the back plate **200** may be substantially or completely solid or have a different opening to that shown in FIG. **2**. The back plate **200** can also include a plurality of through holes **204** to receive various fasteners, sliding pins or other mechanical features as will be discussed below.

The outer lever **92** can include a lever arm **210** that extends from a spindle receiving portion **212**. The lever arm **210** can be generally oriented to extend in one direction for a left hand opening door and in the opposite direction approximately 180 degrees apart for a right hand opening door. In the illustrated configuration the lever arm **210** is pointed towards the left when viewing the apparatus from a forward looking aft position. The spindle receiving portion **212** can be configured to couple with the lever connecting portion **166** of the lever spindle **160**. In one form, the spindle receiving portion **212** can be inserted around the lever spindle shaft **162** after the lever spindle **160** is positioned through the spindle aperture **130** of the outer escutcheon housing **110**. Other forms of coupling the spindle receiving portion **212** of the outer lever **92** with the lever connecting portion **166** of the lever spindle **160** are contemplated by the present disclosure.

The spindle support wall **132** of the spindle aperture **130** in the outer escutcheon housing **110** is configured to support both axial movement and rotational movement of the shaft **162** of the lever spindle **160** such that the spring cage housing **140** can move in axial and rotational directions to implement a change in lever handing orientation as well as opening a latch **80**. In some forms, the inner surface **133** can include a bearing surface to support the lever spindle **160** and spring cage housing **140**. In other embodiments the

outer surface **135** of the spindle support wall **132** can include a bearing surface to support the spring cage housing **140**.

Referring now to FIG. **3**, a cross sectional view of the outer escutcheon housing **110**, handing spring **170**, lever spindle **160** and spring cage housing **140** is shown therein. In this configuration, the handing spring **170** can exert a force on the spring cage housing **140** along an axis **230** in the direction of arrow **240**. The spring force urges the spring cage housing **140** to move in the direction of arrow **240** until the recessed receiver portion **154** of the spring cage rim **152** is axially aligned in a first axial position with a corresponding dimple **120** of the escutcheon housing **110**. When the outer lever **92** is rotated in a clockwise or counterclockwise direction depicted by double arrow **260** with the spring cage housing **140** in the first position, the lever spindle **160** can freely rotate while the spring cage rim **152** is circumferentially locked relative to the outer rim **112** of the outer escutcheon housing **110**.

The lever handing of the lever **92** (shown in FIG. **2**) can be changed when the recessed receiver **154** of the spring cage rim **152** is moved to a second axial position out of axial alignment with the dimple **120** of the outer escutcheon housing **110**. When a force is exerted through the outer lever **92** in the direction of arrow **250** along the axis **230**, the lever spindle **160** will move in the direction of arrow **250** and cause the spring cage rim **152** to also move in the direction **250** through mechanical interaction between the body portion **164** of the lever spindle **160** and the spring cage housing **140**. When the spring cage housing **140** has moved to the second position corresponding to an axial distance sufficient to disengage the recessed receiver portion **154** from the dimple **120** then the entire spring cage housing **140** can be rotated in a counterclockwise or clockwise direction with the lever spindle **160** via mechanical abutment and/or a frictional lock with portions of the lever spindle **160**. The spring cage housing **140** can be rotated or pivoted approximately 180 degrees from the initial orientation to change the handing position. In this manner the lever arm **210** (shown in FIG. **2**) can be changed from a left-handed door to a right-handed door or vice versa as desired. When the force exerted in the direction of arrow **250** is released, the handing spring **170** will urge the spring cage housing **140** in the direction of arrow **240** back to the first position and cause the recessed receiver **154** of spring cage rim **152** to become axially aligned with dimple **120** of the outer escutcheon housing. In the first position, the spring cage rim **152** cannot rotate relative to the outer escutcheon housing **110** and when the outer lever **92** is rotated about the axis of rotation **230** the lever spindle **160** will rotate and cause the latch **80** to open as is conventional.

Referring now FIG. **4**, an alternate embodiment of a lever handing apparatus **100***b* is illustrated therein. Lever handing apparatus **100***b* includes a spring cage housing **140** having one or more pins **300** connected thereto. The one or more pins **300** can selectively project from the spring cage housing **140** through the back plate **200** when the back plate is attached to the outer escutcheon housing **110**. When the pins **300** are positioned to extend through the back plate **200**, the spring cage housing **140** is prevented from rotating relative to the outer escutcheon housing **110**.

FIG. **5** illustrates lever handing apparatus **100***b* in cross-section similar to FIG. **4**, but partially rotated out of plane to show the cross section of the pins **300**. Each pin **300** can be connected to the spring cage wall **150** in a plurality of configurations. In one form each pin **300** can be releasably connected with the spring cage wall **150** via threaded engagement or the like. In alternative forms each pin **300** can be attached via weld, press fit or integral formation with the spring cage wall **150**. The handing spring **170** operates to urge the spring cage housing **140** towards a first position in the direction of arrow **240** along the axis **230** such that each pin **300** is engaged through a portion of the back plate **200**. In the first position a portion of each pin **300** extends through the back plate **200** to prevent rotation of the spring cage housing **140** relative to the outer escutcheon housing **110**. When an axial force greater than the force of the handing spring **170** is exerted in a direction depicted by arrow **250**, the spring cage housing **140** will move to a second position wherein each pin **300** is disengaged from the back plate **200**. When the pins **300** are disengaged from the back plate **200**, the spring cage housing **140** can freely rotate about the axis **230** as depicted by double arrow **260**. The axial movement and the rotational movement of the spring cage housing **140** can be generated through an external force applied to the outer lever **92** (see FIG. **2**) such as a force from a user's hand. When the pins **300** are disengaged from the back wall **200** the spring cage housing **140** can be pivoted approximately 180 degrees to change the handing between a left-handed and right-handed configuration as desired. After the spring cage housing **140** is oriented in the desired handed position and the one or more pins **300** are in alignment with corresponding through holes formed in the back plate **200**, the outer lever **92** can be released and the handing spring will urge the pins **300** to slidingly engage with the back plate **200** and thus prevent further rotation of the spring cage housing **140** relative to the outer escutcheon housing **110**.

FIGS. **6** and **7** illustrate yet another embodiment of the lever handing apparatus **100***c*. In this form, the spring cage housing **140** can include one or more posts **156** having a threaded shank **430** configured to threadingly engage a threaded receiver **420** formed with the spring cage wall **150**. The threaded post **156** can include a hex head **410** or other grip-able features configured to permit a torque to be applied to the threaded post **156**. In one form a flange **412** can be integrally formed with the threaded post **156** to engage the back plate **200**, however in other forms the threaded posts **156** may not include a flange **412**. When the threaded post **156** is installed with the spring cage wall **150** the spring cage housing **140** is prevented from rotating relative to the outer escutcheon housing **110**. With the embodiment shown in FIGS. **6** and **7**, the handing spring **170** may be optionally employed as the threaded posts **156** are completely removed and not slidingly disengaged with the back plate **200** as with other embodiments of the present disclosure. When the one or more posts **156** are removed from the handing apparatus **100***c*, the spring cage housing **140** can be rotated about the axis **230** in either direction as depicted by double arrow **260**. The spring cage housing **140** can be rotated approximately 180 degrees to permit a handing change of the lever **92** between left-hand and right-hand configurations. After the lever **92** is repositioned, the threaded post **156** can be reinserted through the back plate **200** and threadingly engaged with the spring cage wall **150** to prevent further rotation of the spring cage housing **140** relative to the escutcheon housing **110**. In one configuration two threaded posts **156** can be used, but in other configurations a single post can be used or alternatively more than two posts can be used. Regardless of the number of threaded posts **156** that are used with the lever handing apparatus **100***c*, threaded receivers **420** formed in the spring cage wall **150** must be positioned so as to align with the post **156** when the lever **92** is in a left hand orientation and at 180 degrees apart in a right hand configuration.

FIGS. **8** and **9** illustrate yet another embodiment of the lever handing apparatus **100***d*. In this form, the back plate **200** can include one or more tabs **500** projecting radially inward from an inner boundary wall **202**. Each tab **500** can include a radial extension **502** and an axial extension **504** projecting from the radial extension **502**. Other configurations of tabs **500** as would be known to those skilled in the art can also fall within the teachings of the present disclosure. A substantially U-shaped clip **520** can be used to rotatably lock the spring cage housing **140** to the outer escutcheon housing **110** when the back plate **200** is connected to the escutcheon housing **110**. It should be noted that other types or configurations of connecting tabs and removable clips are contemplated by the present disclosure and the U-shaped clip is only one non-limiting example of a removable clip. The back plate **200** can include at least one through hole **204** for a threaded fastener **205** to extend therethrough and threadingly connect with a threaded receiver **206** extending from the outer escutcheon housing **110**.

As with other embodiments, one or more posts **156** can be connected to the spring cage housing **140** and project toward the back plate **200** such that each post is radially inward and substantially circumferentially aligned with a corresponding tab **500**. The substantially U-shaped clip **520** can include a pair of opposing legs **522** and **524** extending from a base portion **526**. The U-shaped clip **520** can be formed from a resilient material such as plastic, metal or composite to name just a few non-limiting examples. Other features such a specific shapes, curves and angular portions can be formed on the U-shaped clip to selectively facilitate a locked connection between the posts **156** of the spring cage housing **140** and the tabs **500** of the back plate **200** as one skilled in the art would readily understand. When the U-shaped clip **520** is positioned such that the base **526** is installed around a corresponding post **156** and the opposing legs **522**, **524** extend across a corresponding tab **500** as shown in FIG. **9**, the spring cage housing **140** is prevented from rotating relative to the outer escutcheon housing **110**.

The lever handing apparatus **100***d* can change handing orientation of the lever arm **210** when the U-shaped clips **520** are removed from an installed condition. The U-shaped clips **520** can be removed by deflecting the legs **522**, **524** apart from one another and sliding the base **526** away from the post **156**. In some configurations a specialized tool may be used to remove the U-shaped clips **520**, however in other embodiments the U-shaped clips **520** may be removed without the aid of any tool. When the substantially U-shaped clips **520** are removed, the spring cage housing **140** can be rotated 180 degrees to change the lever handing orientation. The U-shaped clips **520** can then be reinstalled to prevent further rotation of the spring cage housing **140** relative to the outer escutcheon housing **110** when the lever handle **92** is rotated.

In operation, the lever **92** can be handed (changed between left hand and right hand configurations) in a simplified manner with the lever handing apparatus **100** of the present disclosure. In one embodiment, the lever handle **92** can be pulled outward from a first axial position to a second axial position by a user and then the handle can be rotated or pivoted approximately 180 degrees to change the handle orientation. When the lever handle **92** is pulled outward relative to the door **20**, a mechanical abutment between the spring cage housing **140** and the outer escutcheon housing **110** is moved out of circumferential engagement so as to permit rotation of the spring cage housing **140** relative to the escutcheon housing **110**. After the spring cage housing **140** has been rotated to a desired position, the handle can be released and the spring member **170** will urge the spring cage housing **140** back to the original first axial position. In the first position, the abutment between the spring cage housing **140** and the escutcheon housing **110** is once again axially positioned to prevent further relative rotation therebetween. Because the lever handle **92** is coupled to the spring cage housing **140**, the handle will be repositioned to a left hand or right hand orientation when the spring cage housing **140** has been rotated 180 degrees.

In another embodiment, a removable clip such as a substantially U-shaped clip can circumferentially lock the spring cage housing **140** to the escutcheon housing **110**. When the U-shaped clip is removed, the spring cage housing **140** can be rotated 180 degrees to permit a handing change of the lever **92**. After the lever **92** has been repositioned, the U-shaped clip can be reinstalled to prevent further relative rotation between the spring cage housing **140** and the escutcheon housing **110**. While a U-shaped clip has been illustrated in the disclosed embodiments, it should be understood that other types of fasteners or pins for relative circumferential constraint between the spring cage housing **140** and the escutcheon housing **110** could be used as one skilled in the art would readily understand.

In yet another embodiment, one or more threaded fasteners **156** can extend through the back plate **200** and threadingly engage with the spring cage housing **140** to prevent circumferential movement or rotation relative to the escutcheon housing **110**. When the one or more fasteners are removed, the spring cage housing **140** can be rotated 180 degrees to change the lever handing and the threaded fastener(s) **156** can then be reinserted to prevent further relative rotation of the spring cage housing **140**.

In one aspect the present disclosure includes a lever handing apparatus comprising: a spring cage housing having a first wall with a through aperture formed therein and an outer rim extending from the first wall; a lever spindle having a body portion with a shaft extending therefrom being positionable through the aperture of the spring cage wall; an escutcheon housing with a front wall extending to a perimeter wall formed around the front wall; an aperture formed through the front wall of the escutcheon housing for receiving a portion of the lever spindle shaft therethrough; a resilient member positioned between the spring cage housing and the escutcheon housing; and wherein the spring cage housing selectively rotatable and movable in an axial direction between a first position and a second position relative to the escutcheon housing.

Refining aspects include a back plate connectable to the escutcheon housing configured to enclose the spring cage housing, the lever spindle and the resilient member therebetween; a lever handle connectable to the lever spindle; wherein the lever spindle is rotatable relative to the spring cage housing; wherein the escutcheon housing includes at least one abutment protruding radially inward from the perimeter wall; wherein the outer rim of the spring cage housing includes at least one recessed portion protruding radially inward and complementary to the at least one abutment of the perimeter wall of the escutcheon housing; wherein the resilient member is operable to urge the spring cage housing into the first position to axially align the at least one recessed portion of the outer rim with the at least one abutment of the perimeter wall; wherein the spring cage housing is prevented from rotating relative to the escutcheon housing in the first position; wherein the at least one recessed portion of the spring cage housing and the at least one abutment of the escutcheon housing are not axially aligned such that the spring cage housing is rotatable relative

to the escutcheon housing when the spring cage housing is in the second position; wherein a lever handing is changeable between a left hand and right hand orientation by rotating the spring cage housing approximately 180 degrees when the spring cage housing is in the second position; wherein a force transmitted through the lever spindle urges movement of the spring cage housing toward the second position; wherein at least one pin extending from the spring cage housing toward the back plate; wherein the at least one pin slidingly engages the back plate when the spring cage housing is in the first position and is disengaged from the back plate in the second position; and wherein the engaged pin in the first position prevents rotation of the spring cage housing relative to the escutcheon housing.

Another aspect of the present disclosure includes a lever handing apparatus comprising: a spring cage housing having a first wall with a through aperture formed therein and an outer rim extending from the first wall; a lever spindle having a body portion with a shaft extending therefrom being positionable through the aperture of the spring cage wall; an escutcheon housing with a front wall extending to a perimeter wall formed around the front wall; an aperture formed through the front wall of the escutcheon housing for receiving a portion of the lever spindle shaft therethrough; a back plate having one or more through apertures being connectable to the escutcheon housing; and wherein the spring cage housing is selectively locked to the back plate and is rotatable relative to the escutcheon housing when unlocked.

Another refining aspect includes at least one post projecting from the spring cage housing toward the back plate; at least one tab projecting radially inward from an inner perimeter wall of the back plate; at least one substantially U-shaped clip configured to lock the at least one post and the at least one tab together to prevent rotation of the spring cage housing relative to the escutcheon housing; wherein the spring cage housing is rotatable relative to the escutcheon housing to permit change of lever handing orientation when unlocked; and a resilient member engaged with the spring cage housing.

Another aspect of the present disclosure includes a lever handing apparatus comprising: a spring cage housing having a first wall with a through aperture formed therein and an outer rim extending from the first wall; a lever spindle having a body portion with a shaft extending therefrom being positionable through the aperture of the spring cage wall; an escutcheon housing with a front wall extending to a perimeter wall formed around the front wall; an aperture formed through the front wall of the escutcheon housing for receiving a portion of the lever spindle shaft therethrough; a back plate connectable to the escutcheon housing; and at least one threaded fastener extendable through the back plate to threadingly engage with the spring cage housing and rotatably lock the spring cage housing relative to the escutcheon housing.

Another refining aspect includes an apparatus wherein the spring cage housing is rotatable to change the lever handing between a left hand orientation and a right hand orientation when the at least one threaded fastener is removed.

Another aspect of the present disclosure includes a method comprising: gripping a lever handle; pulling the lever handle in first axial direction along an axis of rotation; moving a spring cage housing in the first axial direction from a first position to a second position with respect to an escutcheon housing in response to the pulling; rotating the lever handle approximately 180 degrees to change a lever handing orientation; urging the spring cage to move in a second axial direction from the second position to the first position; and locking the spring cage housing with respect to the escutcheon housing with an abutment to prevent relative rotation between the spring cage housing and the escutcheon housing.

Another refining aspect includes a method wherein the locking includes at least one recessed portion projecting radially inward from an outer rim of the spring cage housing and at least one protrusion projecting radially inward from the perimeter wall of the escutcheon housing; and wherein the locking includes at least one pin projecting from the spring cage assembly to selectively engage with a back plate coupled with the escutcheon housing.

It should be understood that the component and assembly configurations of the present disclosure can be varied according to specific design requirements and need not conform to the general shape, size, connecting means or general configuration shown in the illustrative drawings to fall within the scope and teachings of this patent application.

While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment (s), but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims, which scope is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures as permitted under the law. Furthermore it should be understood that while the use of the word preferable, preferably, or preferred in the description above indicates that feature so described may be more desirable, it nonetheless may not be necessary and any embodiment lacking the same may be contemplated as within the scope of the invention, that scope being defined by the claims that follow. In reading the claims it is intended that when words such as "a," "an," "at least one" and "at least a portion" are used, there is no intention to limit the claim to only one item unless specifically stated to the contrary in the claim. Further, when the language "at least a portion" and/or "a portion" is used the item may include a portion and/or the entire item unless specifically stated to the contrary.

What is claimed is:

1. A lockset, comprising:

a latch assembly;

a housing assembly;

a lever handle movably mounted to the housing assembly for rotational movement about a rotational axis and for axial movement along the rotational axis, wherein the lever handle is operably connected with the latch assembly; and

a lever handing assembly operable to selectively provide the lever handle in each of a first handing orientation and a second handing orientation different from the first handing orientation;

wherein axial movement of the lever handle along the rotational axis from a first position to a second position moves the lever handing assembly from an engaged condition to a disengaged condition;

wherein, with the lever handing assembly in the engaged condition, the lever handle is provided in one of the first handing orientation or the second handing orientation; and

wherein, with the lever handing assembly in the disengaged condition, the lever handle is movable between the first handing orientation and the second handing orientation.

2. The lockset of claim 1, wherein the lever handing assembly comprises:

a spring cage housing comprising a first engagement feature; and

a spindle rotatably mounted to the spring cage housing;

wherein the housing assembly comprises a second engagement feature operable to engage the first engagement feature;

wherein, with the lever handing assembly in the engaged condition and the lever handle in the first handing orientation, the first engagement feature and the second engagement feature are engaged with one another to prevent rotation of the spring cage housing relative to the housing assembly about the rotational axis; and

wherein, with the lever handing assembly in the disengaged condition, the first engagement feature and the second engagement feature are disengaged from one another to permit rotation of the spring cage housing relative to the housing assembly about the rotational axis.

3. The lockset of claim 2, wherein the housing assembly further comprises a third engagement feature operable to engage the first engagement feature;

wherein, with the lever handing assembly in the engaged condition and the lever handle in the second handing orientation, the first engagement feature and the third engagement feature are engaged with one another to prevent rotation of the spring cage housing relative to the housing assembly about the rotational axis; and

wherein, with the lever handing assembly in the disengaged condition, the first engagement feature and the third engagement feature are disengaged from one another to permit rotation of the spring cage housing relative to the housing assembly about the rotational axis.

4. A lockset, comprising:

a housing assembly;

a spring cage housing movably mounted to the housing assembly, wherein the spring cage housing is movable relative to the housing assembly along a rotational axis between an engaged position and a disengaged position; and

a spindle rotatably mounted to the spring cage housing for rotation about the rotational axis and axially coupled with the spring cage housing for joint movement with the spring cage housing along the rotational axis;

wherein, with the spring cage housing in the engaged position, the spring cage housing is rotationally coupled with the housing assembly;

wherein, with the spring cage housing in the disengaged position, the spring cage housing is rotatable relative to the housing assembly between a first handing orientation and a second handing orientation; and

wherein the spring cage housing is configured to move between the engaged position and the disengaged position in response to joint axial movement of the spindle and the spring cage housing along the rotational axis.

5. The lockset of claim 4, further comprising an abutment and a recess;

wherein the abutment is engaged with the recess when the spring cage housing is in the engaged position and the spring cage housing is in the first handing orientation; and

wherein the abutment is disengaged from the recess when the spring cage housing is in the disengaged position.

6. The lockset of claim 5, further comprising a second abutment;

wherein the second abutment is engaged with the recess when the spring cage housing is in the engaged position and the spring cage housing is in the second handing orientation; and

wherein the second abutment is disengaged from the recess when the spring cage housing is in the disengaged position.

7. The lockset of claim 5, wherein one of the housing assembly or the spring cage housing comprises the abutment; and

wherein the other of the housing assembly or the spring cage housing comprises the recess.

8. The lockset of claim 6, wherein the housing assembly comprises the abutment.

9. The lockset of claim 8, wherein an escutcheon housing of the housing assembly comprises the abutment.

10. The lockset of claim 4, further comprising a resilient member biasing the spring cage housing toward the engaged position.

11. The lockset of claim 10, wherein the housing assembly comprises an escutcheon housing and a back plate; and

wherein the resilient member is engaged between the spring cage housing and the back plate.

12. The lockset of claim 4, further comprising:

a latch assembly operably connected with the spindle such that the latch assembly is actuated by rotation of the spindle about the rotational axis when the spring cage housing is in the engaged position; and

a lever handle mounted to the spindle such that the lever handle is operable to rotate the spindle about the rotational axis.

13. A lockset, comprising:

a housing assembly;

a spring cage housing movably mounted to the housing assembly for movement between an engaged position and a disengaged position; and

a spindle rotatably mounted to the spring cage housing for rotation about a rotational axis;

wherein the spring cage housing is configured to move between the engaged position and the disengaged position in response to axial movement of the spindle along the rotational axis;

wherein one of the housing assembly or the spring cage housing comprises a first engagement feature;

wherein the other of the housing assembly or the spring cage housing comprises a second engagement feature and a third engagement feature;

wherein, with the spring cage housing in the disengaged position, the first engagement feature is disengaged from each of the second engagement feature and the third engagement feature, and the spring cage housing is rotatable relative to the housing assembly about the rotational axis between a first handing orientation and a second handing orientation different from the first handing orientation;

wherein, with the spring cage housing in the engaged position and the first handing orientation, the first engagement feature and the second engagement feature are engaged with one another to prevent rotation of the spring cage housing relative to the housing assembly about the rotational axis; and

wherein, with the spring cage housing in the engaged position and the second handing orientation, the first engagement feature and the third engagement feature are engaged with one another to prevent rotation of the spring cage housing relative to the housing assembly about the rotational axis.

14. The lockset of claim 13, further comprising a resilient member biasing the spring cage housing toward the engaged position.

15. The lockset of claim 13, wherein the first engagement feature comprises one of an abutment or a recess; and

wherein the second engagement feature and the third engagement feature each comprises the other of the abutment or the recess.

16. The lockset of claim 13, wherein the first engagement feature comprises one of a post or an aperture; and

wherein each of the second engagement feature and the third engagement feature comprises the other of the post or the aperture.

17. The lockset of claim 13, wherein the housing assembly comprises the first engagement feature; and

wherein the spring cage housing comprises the second engagement feature and the third engagement feature.

18. The trim assembly of claim 17, wherein the first engagement feature is formed on an inner periphery of the housing assembly; and

wherein each of the second engagement feature and the third engagement feature is formed on an outer periphery of the spring cage housing.

19. The lockset of claim 13, further comprising:

a latch assembly operably connected with the spindle such that the latch assembly is actuated by rotation of the spindle about the rotational axis when the spring cage housing is in the engaged position; and

a lever handle mounted to the spindle such that the lever handle is operable to rotate the spindle about the rotational axis.

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