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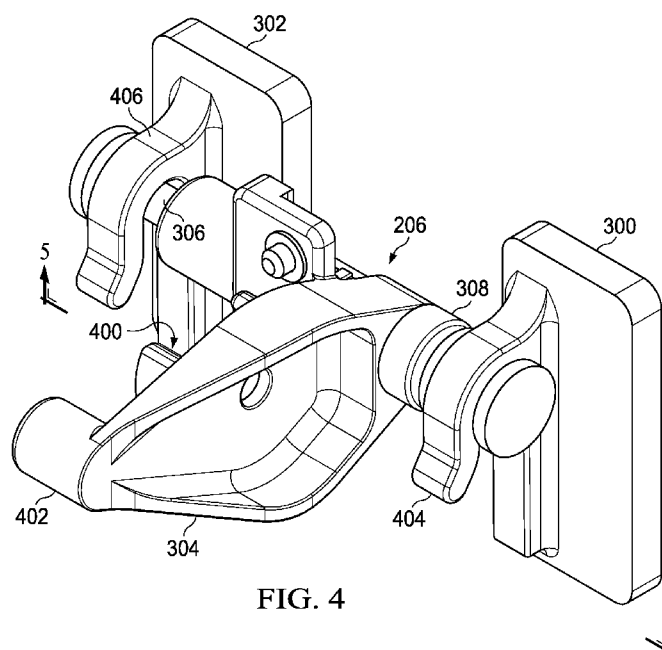
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(54) Title: LATCH WITH A BUILD-IN ADJUSTMENT MECHANISM



(57) Abstract: A method and apparatus is provided for adjusting a latch. An apparatus comprises a latch body (304), a first member (308), and a second member (306) associated with the latch body (304). A receiving area (118) extends through at least a portion of the latch body (304). The first member (308) is configured to be at least partially received within the receiving area (108) of the latch body (304). The first member (308) has a first coupling element (522). The second member (306) has a second coupling element (530). Movement of the first member (308) along an axis through the receiving area (118) changes a distance between the first coupling element (522) and the second coupling element (530).

LATCH WITH A BUILT-IN ADJUSTMENT MECHANISM

BACKGROUND INFORMATION

1. Field:

The present disclosure relates generally to a latch and, in particular, to a latch for joining panels without using any additional tools. Still more particularly, the present disclosure relates to a latch that allows two panels to be joined and the width of the gap formed between the two panels to be adjusted.

2. Background:

Typically, the sidewalls of an aircraft interior are formed by installing panels that are joined together using mechanical fasteners. These panels may be referred to as, for example, "wall panels" or "sidewall panels." With some currently available techniques for joining panels, a bracket having multiple slots is used to join two panels together. Each of these slots has an elongate shape such as, for example, an oval shape. A nut plate is located within each of these slots and is allowed to move freely within the corresponding slot of the bracket. Each of the nut plates is configured to receive the threaded end of a screw.

These screws are used to fasten the panels to the bracket. In particular, each panel may have an attachment feature, such as, for example, without limitation, a loop, configured to receive the threaded end of a screw. When the bracket and the nut plates located in the slots of the bracket are positioned relative to the panels, screws are driven through the loops and into the nut plates to fasten the panels to the bracket. In this manner, the two panels are joined together by the bracket.

However, joining panels using these types of brackets, nut plates, and screws may take more time and/or effort than desired. Additionally, tools may be needed to drive the screws into the nut plates. For example, screwdrivers, screw guns, and/or other types of tools may be needed.

Further, with these types of currently available techniques, the panels may be joined outside of selected tolerances. In particular, the width of the gap formed between the panels after the panels are joined together may be greater than desired. Consequently, the installation of these panels may need to be reworked multiple times

to achieve an installation of panels that are within selected tolerances. This reworking may take more time and/or effort than desired. Further, the reworking may be more expensive than desired. Therefore, it would be desirable to have a method and apparatus that take into account at least some of the issues discussed above, as well as other possible issues.

SUMMARY

In one illustrative embodiment, an apparatus comprises a latch body, a first member, and a second member associated with the latch body. A receiving area extends through at least a portion of the latch body. The first member is configured to be at least partially received within the receiving area of the latch body. The first member has a first coupling element. The second member has a second coupling element. Movement of the first member along an axis through the receiving area changes a distance between the first coupling element and the second coupling element.

In another illustrative embodiment, a method for adjusting a latch is provided. A first member having a first coupling element is inserted at least partially through a receiving area that extends through at least a portion of a latch body of the latch. The first member moves along an axis through the receiving area such that a distance between the first coupling element and a second coupling element of a second member associated with the latch body changes.

Further, the disclosure comprises embodiments according to the following clauses:

Clause 1. An apparatus comprising:

a latch body, wherein a receiving area extends through at least a portion of the latch body;

a first member configured to be at least partially received within the receiving area of the latch body, wherein the first member has a first coupling element; and

a second member associated with the latch body, wherein the second member has a second coupling element and wherein movement of the first member along an axis through the receiving area changes a distance between the first coupling element and the second coupling element.

Clause 2. The apparatus of clause 1 further comprising:

an adjustment member configured to form a portion of the receiving area and receive at least a portion of the first member and wherein relative rotation between the adjustment member and the first member causes the first member to move along the axis.

Clause 3. The apparatus of clause 2, wherein the adjustment member is a separate component positioned relative to the latch body and configured to be held within a retaining area formed by the latch body such that a channel through the latch body opens into a hole within the adjustment member to form the receiving area.

Clause 4. The apparatus of clause 2, wherein the first member has outer threads configured to engage inner threads along a hole in the adjustment member.

Clause 5. The apparatus of claim 2 further comprising:

a locking mechanism configured to prevent the relative rotation between the adjustment member and the first member.

Clause 6. The apparatus of clause 5, wherein the locking mechanism comprises:

a pivotable element, wherein rotation of the pivotable element into a locked position locks the adjustment member in place to prevent the relative rotation between the adjustment member and the first member and wherein rotation of the pivotable element into an unlocked position unlocks the adjustment member to allow the relative rotation between the adjustment member and the first member.

Clause 7. The apparatus of clause 6, wherein the adjustment member comprises:

a plurality of grooves, wherein the pivotable element is configured to enter a groove in the plurality of grooves when the pivotable element is in the locked position.

Clause 8. The apparatus of clause 1, wherein the first member comprises:

a stop feature configured to enter a control area within the latch body when the first member enters the receiving area within the latch body, wherein the control area has an open end and a closed end.

5 Clause 9. The apparatus of clause 8 further comprising:

an end element configured for association with the latch body, wherein the end element is used to close the open end of the control area with the stop feature of the first member located within the control area such that a distance by which the first member can be moved along the axis is determined by a length of the control area.

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Clause 10. The apparatus of clause 1, wherein a first attachment structure is configured to engage the first coupling element of the first member and a second attachment structure is configured to engage the second coupling element of the second member.

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Clause 11. The apparatus of clause 10, wherein the first attachment structure comprises a first hook configured to engage the first coupling element of the first member and the second attachment structure comprises a second hook configured to engage the second coupling element of the second member.

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Clause 12. The apparatus of clause 10, wherein the first attachment structure is associated with a first panel and wherein the second attachment structure is associated with a second panel.

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Clause 13. The apparatus of clause 12, wherein the first panel and the second panel are configured for use in forming a sidewall for an interior of an aircraft.

Clause 14. The apparatus of clause 12, wherein moving the first member along the axis through the receiving area such that the distance between the first coupling element and the second coupling element changes a width of a gap between the first panel and the second panel.

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Clause 15. The apparatus of clause 12, wherein the latch body is configured for attachment to a structural member such that the first panel and the second panel are associated with the structural member.

5 Clause 16. The apparatus of clause 1, wherein the first coupling element is a first elongated portion of the first member configured to receive a first hook and the second coupling element is a second elongated portion of the second member configured to receive a second hook.

10 Clause 17. A method for adjusting a latch, the method comprising:
inserting a first member having a first coupling element at least partially through a receiving area that extends through at least a portion of a latch body of the latch; and
moving the first member along an axis through the receiving area such that a distance between the first coupling element and a second coupling element of a second
15 member associated with the latch body changes.

Clause 18. The method of clause 17, wherein moving the first member along the axis through the receiving area comprises:

rotating the first member relative to an adjustment member that forms a portion of
20 the receiving area to move the first member along the axis through the receiving area such that the distance between the first coupling element and the second coupling element of the second member associated with the latch body changes.

Clause 19. The method of clause 17 further comprising:

25 engaging the first coupling element of the first member with a first attachment structure associated with a first panel; and

engaging the second coupling element of the second member with a second attachment structure associated with a second panel.

30 Clause 20. The method of clause 19, wherein moving the first member along the axis through the receiving area comprises:

moving the first member along the axis through the receiving area to change the distance between the first coupling element and the second coupling element such that a width of a gap between the first panel and the second panel changes.

5 Clause 21. An aircraft comprising the apparatus of any of clauses 1 to 16.

The features and functions can be achieved independently in various embodiments of the present disclosure or may be combined in yet other embodiments in which further details can be seen with reference to the following description and
10 drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the illustrative embodiments are set forth in the appended claims. The illustrative embodiments, however, as well as a
15 preferred mode of use, further objectives and features thereof, will best be understood by reference to the following detailed description of an illustrative embodiment of the present disclosure when read in conjunction with the accompanying drawings, wherein:

Figure 1 is an illustration of a latch in the form of a block diagram in accordance with an illustrative embodiment;

20 **Figure 2** is an illustration of a portion of a sidewall for an interior of an aircraft in accordance with an illustrative embodiment;

Figure 3 is an illustration of an enlarged view of a portion of a sidewall with a latch in accordance with an illustrative embodiment;

25 **Figure 4** is an illustration of an isometric view of a latch in accordance with an illustrative embodiment;

Figure 5 is an illustration of a top cross-sectional view of a latch in accordance with an illustrative embodiment;

Figure 6 is an illustration of an exploded isometric view of a latch in accordance with an illustrative embodiment;

30 **Figure 7** is an illustration of a latch having a locking mechanism in an unlocked position in accordance with an illustrative embodiment;

Figure 8 is an illustration of a latch having a locking mechanism in a locked position in accordance with an illustrative embodiment;

Figure 9 is an illustration of a process for adjusting a latch in the form of a flowchart in accordance with an illustrative embodiment;

Figure 10 is an illustration of a process for attaching panels to each other using a latch in the form of a flowchart in accordance with an illustrative embodiment;

5 **Figure 11** is an illustration of an aircraft manufacturing and service method in the form of a flowchart in accordance with an illustrative embodiment; and

Figure 12 is an illustration of an aircraft in the form of a block diagram in accordance with an illustrative embodiment.

10 **DETAILED DESCRIPTION**

The illustrative embodiments recognize and take into account different considerations. For example, the illustrative embodiments recognize and take into account that a latch that is capable of joining together wall panels without requiring any additional tools may reduce the time and/or effort needed to join and install these wall
15 panels. Further, the illustrative embodiments recognize and take into account that it may be desirable to have a latch that allows the width of the gap formed between joined wall panels to be adjusted without requiring that the wall panels be disengaged and rejoined one or more times.

Thus, the illustrative embodiments provide a method and apparatus for joining
20 panels using a latch that has a built-in adjustment mechanism. Further, the illustrative embodiments provide a latch that does not require any additional tools to lock fasteners received in the latch in fixed positions.

With reference now to **Figure 1**, an illustration of a latch in the form of a block diagram is depicted in accordance with an illustrative embodiment. In **Figure 1**, latch
25 **100** may be used to join first panel **102** and second panel **104**. First panel **102** and second panel **104** may be, for example, without limitation, sidewall panels for the interior of an aircraft.

In this illustrative example, latch **100** includes latch body **106**, first member **112**, second member **108**, adjustment member **110**, and locking mechanism **114**. As
30 depicted, second member **108** may be associated with latch body **106**. Further, second member **108** may or may not be moveable relative to latch body **106**, depending on the implementation.

When one component is “associated” with another component, the association is a physical association in the depicted examples. For example, a first component, such as second member **108** may be considered to be associated with a second component, such as latch body **106**, by being secured to the second component, bonded to the second component, mounted to the second component, welded to the second component, fastened to the second component, and/or connected to the second component in some other suitable manner.

The first component also may be connected to the second component using a third component. In some cases, the first component may be considered to be associated with the second component by being formed as part of and/or an extension of the second component. In other words, the first component may be an integral part of the second component. In some cases, the second component may be considered an integral part of the first component.

In this illustrative example, receiving area **118** may extend through at least a portion of latch body **106**. In one illustrative example, receiving area **118** may be a hole within latch body **106** having one open end and one closed end. In another example, receiving area **118** may be partially formed by a channel that extends through latch body **106**. This channel may be open at both ends.

At least a portion of receiving area **118** may be formed by adjustment member **110**. In one illustrative example, adjustment member **110** may be positioned relative to latch body **106**. In particular, adjustment member **110** may be held within retaining area **116** formed by latch body **106**. Retaining area **116** may be an open space or cavity formed by latch body **106** having a size and/or shape configured to receive adjustment member **110**. Adjustment member **110** may take a number of different forms. In one illustrative example, adjustment member **110** may be a separate component from latch body **106**. For example, adjustment member **110** may take the form of a cam.

Of course, in other illustrative examples, adjustment member **110** may be formed by a portion of latch body **106**. In other words, adjustment member **110** may be part of latch body **106**. For example, adjustment member **110** may be the portion of latch body **106** that defines the hole through latch body **106** that forms receiving area **118**.

When adjustment member **110** is positioned within retaining area **116**, receiving area **118** may be formed. Receiving area **118** may extend through latch body **106** and adjustment member **110**. In particular, latch body **106** may have one or more openings

or holes that form a portion of receiving area **118**. Further, adjustment member **110** may have a hole that forms a portion of receiving area **118**.

When adjustment member **110** is separate from latch body **106** and when the hole in adjustment member **112** is open at both ends, receiving area **118** may be referred to as a channel that extends through latch body **106** and adjustment member **112**. Although a channel is described as having two open ends in these illustrative examples, a channel may have one open end and one closed end, depending on the implementation.

Receiving area **118** is configured to at least partially receive first member **112**. For example, first member **112** may be at least partially inserted within receiving area **118** such that first member **112** is retained by receiving area **118**.

Axis **120** may extend through receiving area **118**. In one illustrative example, axis **120** may be a center longitudinal axis through receiving area **118**. In this illustrative example, first member **112** may be moved in a direction along axis **120** through receiving area **118**. In particular, relative rotation between adjustment member **110** and first member **112** may cause first member **112** to move along axis **120**. Relative rotation between adjustment member **110** and first member **112** may be rotation of one relative to the other. In this manner, relative rotation between adjustment member **110** and first member **112** may include rotation of adjustment member **110** and/or rotation of first member **112**.

In one illustrative example, adjustment member **110** may be rotated about axis **120** to cause first member **112** to move along axis **120**. For example, at least a portion of first member **112** may have outer threads **122**. More specifically, outer threads **122** may be located on the outer surface of a portion of first member **112**. Further, adjustment member **110** may have inner threads **124**. Inner threads **124** may define the hole through adjustment member **110** that forms a portion of receiving area **118**. Outer threads **122** of first member **112** may be configured to engage inner threads **124** of adjustment member **110** in a manner that causes first member **112** to move in a direction along axis **120** when adjustment member **110** is rotated about axis **120**.

Further, first member **112** may have first coupling element **154** and second member **108** may have second coupling element **156**. Movement of first member **112** along axis **120** may change a distance between first coupling element **154** and second coupling element **156**. In one illustrative example, first coupling element **154** may take

the form of a first elongated portion of first member **112** and second coupling element **156** may take the form of a second elongated portion of second member **108**.

Movement of first member **112** in one direction along axis **120** may lengthen the distance between first coupling element **154** and second coupling element **156**, while movement of first member **112** in the other direction along axis **120** may shorten the distance between first coupling element **154** and second coupling element **156**.

As depicted, control area **126** may be present in association with receiving area **118**. In one illustrative example, control area **126** may be considered part of receiving area **118**. However, in some illustrative examples, control area **126** may be considered an additional hole, opening, or channel that runs substantially parallel to receiving area **118** and opens to receiving area **118**. In this illustrative example, control area **126** has open end **128** and closed end **130**. Closed end **130** may be formed by some structural portion of latch body **106**. Open end **128** may be configured to receive stop feature **132** associated with first member **112**.

Stop feature **132** may be associated with outer threads **122** of first member **112** in one illustrative example. Stop feature **132** may take the form of, for example, without limitation, a protrusion at some point along outer threads **122**. First member **112** may be inserted into receiving area **118** in such a manner that stop feature **132** enters control area **126**.

In this illustrative example, end element **134** may be associated with latch body **106**. End element **134** may take the form of, for example, without limitation, cap **136**. Cap **136** may be attached to latch body **106** at the entrance into receiving area **118**. Cap **136** may have opening **138** that leads into receiving area **118**. First member **112** may be inserted through opening **138** into receiving area **118**.

As depicted, opening **138** may have shape **140** selected to receive first member **112** and stop feature **132**. Shape **140** may be selected such that only one position for cap **136** relative to axis **120** may allow both first member **112** and stop feature **132** to pass through opening **138** and into receiving area **118**. In one illustrative example, shape **140** may be a shape that substantially matches the cross-sectional shape of receiving area **118** and control area **126** for the cross-section taken perpendicular to axis **120**.

In this illustrative example, cap **136** may be rotated about axis **120** until shape **140** aligns with receiving area **118** and control area **126**. When proper alignment is not

achieved, opening **138** may not open to open end **128** of control area **126**. However, when proper alignment is achieved, opening **138** may open to open end **128** of control area **126**.

When cap **136** is positioned such that shape **140** aligns with receiving area **118** and control area **126**, first member **112** may be inserted through opening **138** into receiving area **118** and stop feature **132** may pass through opening **138** into control area **126**. After stop feature **132** has fully entered control area **126**, cap **136** may then be rotated about axis **120** to close open end **128** of control area **126**.

In this manner, the movement of stop feature **132** may be limited by the first boundary formed by cap **136** at open end **128** and the second boundary formed by closed end **130** of control area **126**. In particular, adjustment member **110** may be rotated about axis **120** to move first member **112** along axis **120**. However, the distance by which first member **112** can be moved along axis **120** may be limited by the length of control area **126**.

Once first member **112** has been moved to a certain position along axis **120**, adjustment member **110** may be locked in place using locking mechanism **114**. Locking mechanism **114** is configured to prevent relative rotation between adjustment member **110** and first member **112**. In this manner, movement of first member **112** along axis **120** may be prevented.

In this illustrative example, locking mechanism **114** includes pivotable element **142**. Pivotable element **142** may be configured to pivot between locked position **144** and unlocked position **146**.

When pivotable element **142** is moved to unlocked position **146**, adjustment member **110** may be allowed to rotate about axis **120**. However, when pivotable element **142** is moved to locked position **144**, adjustment member **110** may be prevented from rotating about axis **120**. In this illustrative example, adjustment member **110** may have plurality of grooves **148** along the outer surface of adjustment member **110**. When pivotable element **142** is moved into locked position **144**, a portion of pivotable element **142** may enter, or interface with, one of plurality of grooves **148**. This interfacing may prevent adjustment member **110** from rotating.

As depicted, latch **100** may be attached to first panel **102** using first attachment structure **150** and to second panel **104** using second attachment structure **152**. First

attachment structure **150** may be associated with first panel **102**, while second attachment structure **152** may be associated with second panel **104**.

For example, first attachment structure **150** may engage first coupling element **154** of first member **112** and second attachment structure **152** may engage second coupling element **156** of second member **108**. In one illustrative example, first attachment structure **150** may have first hook **158** that engages first coupling element **154** of first member **112**. In this example, second attachment structure **152** may have second hook **160** that engages second coupling element **156** of second member **108**.

In this manner, latch **100** may be attached to both first panel **102** and second panel **104** to join first panel **102** to second panel **104**. However, gap **162** may be present between first panel **102** and second panel **104**. Adjustment member **110** may be used to adjust width **164** of gap **162** formed between first panel **102** and second panel **104**. Adjustment member **110** may form a “built-in” adjustment mechanism for latch **100**.

In particular, by rotating adjustment member **110** about axis **120**, first member **112** may be moved along axis **120**. Moving first member **112** along axis **120** may move first panel **102** attached to latch **100** by first member **112**. Moving first panel **102** may, in turn, change width **164** of gap **162**.

In this illustrative example, latch **100** may be attached to structural member **166** through latch body **106**. In this manner, latch **100** may be used to attach first panel **102** and second panel **104** to structural member **166**. First panel **102** and second panel **104** may be attached to structural member **166** using latch **100** for the purpose of forming a sidewall for the interior of an aircraft.

The illustration of latch **100** in **Figure 1** is not meant to imply physical or architectural limitations to the manner in which an illustrative embodiment may be implemented. Other components in addition to or in place of the ones illustrated may be used. Some components may be unnecessary. Also, the blocks are presented to illustrate some functional components. One or more of these blocks may be combined, divided, or combined and divided into different blocks when implemented in an illustrative embodiment.

In other illustrative example, second member **108** may be optional. Instead, a second first member may be associated with latch body **106** in the place of second member **108** and configured for attachment to second panel **104**. This second first

member may be moved in a direction along axis **120** using a second adjustment member similar to adjustment member **110**. In this manner, both first panel **102** attached to latch **100** through first member **112** and second panel **104** attached to latch **100** through this second first member may be moved to adjust width **164** of gap **162**.

Turning now to **Figure 2**, an illustration of a portion of a sidewall for an interior of an aircraft is depicted in accordance with an illustrative embodiment. As depicted in **Figure 2**, a portion of sidewall **200** for an interior of an aircraft is depicted. This portion of sidewall **200** is formed by first panel **202** and second panel **204**. First panel **202** and second panel **204** are examples of implementations for first panel **102** and second panel **104**, respectively, in **Figure 1**.

As depicted, first panel **202** and second panel **204** are joined using latch **206** and latch **208**. Further, latch **206** and latch **208** attach to structural member **205**. In this manner, first panel **202** and second panel **204** may be attached to structural member **205** using latch **206** and latch **208**. Structural member **205** may be an example of one implementation for structural member **166** in **Figure 1**.

Further, latch **206** may be an example of one implementation for latch **100** in **Figure 1**. Latch **208** may be a different type of latch. Latch **206** is described in greater detail in **Figures 3-8** below. In particular, portion **210** of sidewall **200** is shown in an enlarged view in **Figure 3**.

With reference now to **Figure 3**, an illustration of an enlarged view of portion **210** of sidewall **200** with latch **206** from **Figure 2** is depicted in accordance with an illustrative embodiment. In **Figure 3**, an enlarged view of portion **210** of sidewall **200** from **Figure 2** is shown without structural member **205** from **Figure 2** such that latch **206** may be more clearly seen.

In this illustrative example, latch **206** is attached to first panel **202** using first attachment structure **300** and attached to second panel **204** using second attachment structure **302**. First attachment structure **300** and second attachment structure **302** may be examples of implementations for first attachment structure **150** and second attachment structure **152**, respectively, in **Figure 1**.

As depicted, latch **206** includes latch body **304**, second member **306**, and first member **308**. Latch body **304**, second member **306**, and first member **308** may be examples of implementations for latch body **106**, second member **108**, and first member **112**, respectively, in **Figure 1**. In this illustrative example, first attachment structure **300**

engages first member **308**, while second attachment structure **302** engages second member **306**.

Turning now to **Figure 4**, an illustration of an isometric view of latch **206** from **Figures 2-3** is depicted in accordance with an illustrative embodiment. As depicted, latch body **304** includes attachment feature **400** and attachment feature **402**. Attachment feature **400** and/or attachment feature **402** may be used to attach latch body **304** to structural member **205** in **Figure 2**.

Further, first attachment structure **300** includes first hook **404**. Second attachment structure **302** includes second hook **406**. First hook **404** engages first member **308**, while second hook **406** engages second member **306**.

With reference now to **Figure 5**, an illustration of a top cross-sectional view of latch **206** from **Figure 4** is depicted in accordance with an illustrative embodiment. In this illustrative example, a top cross-sectional view of latch **206** is depicted, taken with respect to lines **5-5** in **Figure 4**.

As depicted, latch **206** includes adjustment member **500**. Adjustment member **500** is a cam in this illustrative example. Adjustment member **500** is an example of one implementation for adjustment member **110** in **Figure 1**. Adjustment member **500** is held within retaining area **502** formed by latch body **304**. When adjustment member **500** is held within retaining area **502**, channel **504** is formed. Channel **504** may be an example of one implementation for receiving area **118** in **Figure 1**. Channel **504** extends through latch body **304** and adjustment member **500**. In particular, a portion of channel **504** is formed by one or more holes, openings, or channels in latch body **304**, while another portion of channel **504** is formed by an opening, hole, or channel that extends through adjustment member **500**.

In this illustrative example, adjustment member **500** has inner threads **508** along the opening through adjustment member **500** that forms a portion of channel **504**. Further, first member **308** has outer threads **510**. When first member **308** is inserted through channel **504**, inner threads **508** engage outer threads **510**. With inner threads **508** and outer threads **510** engaged, rotation of adjustment member **500** about axis **511** causes movement of first member **308** in a direction along axis **511**.

As depicted, first member **308** has stop feature **512**. Stop feature **512** may enter control area **514** when first member **308** is inserted into channel **504**. In this illustrative example, control area **514** has open end **516** and closed end **518**. Cap **520** may be

used to close open end **516**. Cap **520** may be an example of one implementation for cap **136** in **Figure 1**. When open end **516** is closed by cap **520**, the movement of first member **308** is limited to the movement of stop feature **512** within control area **514**.

In this illustrative example, first hook **404** is depicted engaged with first coupling element **522** of first member **308**. First coupling element **522** of first member **308** is bounded by element **524** and element **526** of first member **308**. Element **524** and element **526** constrain first coupling element **522** such that first coupling element **522** has a width substantially equal to, or just slightly wider than, width **528** of first hook **404**. In this manner, first hook **404** may be constrained by element **524** and element **526**. When engaged with first coupling element **522**, first hook **404** may be constrained such that first hook **404** may be unable to move in a direction along axis **511** independently of first member **308**.

Second hook **406** is depicted engaged with second coupling element **530** of second member **306**. Second coupling element **530** of second member **306** may be wider than width **532** of second hook **406**. In this manner, second hook **406** may be allowed to move in a direction along axis **511** along second coupling element **530** of second member **306** independently of second member **306**. In this manner, when second panel **204** from **Figure 2** is also connected to the first member of another latch, similar to latch **206**, the extra width of second coupling element **530** may allow movement of second panel **204**.

With reference now to **Figure 6**, an illustration of an exploded isometric view of latch **206** is depicted in accordance with an illustrative embodiment. In this illustrative example, the individual components of latch **206** may be more clearly seen. As depicted, latch body **304** may have opening **600** and opening **602** that form a portion of channel **504** from **Figure 5**. Further, adjustment member **500** may have opening **604** that forms a portion of channel **504** from **Figure 5**.

In this illustrative example, cap **520** has opening **606** having shape **608**. Shape **608** may be selected such that first member **308** and stop feature **512** may both pass through opening **606**. Similarly, opening **600** may have shape **609** such that first member **308** and stop feature **512** may pass through opening **600**. Stop feature **512** may pass through opening **600** and enter control area **514** from **Figure 5**.

As depicted, latch **206** may also include locking mechanism **610**. Locking mechanism **610** may be an example of one implementation for locking mechanism **114**.

in **Figure 1**. Locking mechanism **610** includes pivotable element **612** and fastener **614**. Fastener **614** may be used to attach pivotable element **612** to latch body **304**. The functions of locking mechanism **610** are described in greater detail in **Figures 7-8** below.

5 Turning now to **Figure 7**, an illustration of latch **206** having locking mechanism **610** in an unlocked position is depicted in accordance with an illustrative embodiment. In this illustrative example, locking mechanism **610** is unlocked. In particular, pivotable element **612** is in unlocked position **700**. When pivotable element **612** is in unlocked position **700**, pivotable element **612** does not engage or interface with any of plurality of
10 grooves **702** in adjustment member **500**. Consequently, adjustment member **500** may be allowed to rotate about axis **511**.

For example, adjustment member **500** may be rotated in the direction of arrow **704** or the direction of arrow **706** to move first member **308** along axis **511**. In one illustrative example, rotating adjustment member **500** in the direction of arrow **704** may
15 cause movement of first member **308** in the direction of arrow **708**. In this example, rotating adjustment member **500** in the direction of arrow **706** may cause movement of first member **308** in the direction of arrow **710**.

Pivotable element **612** may be rotated in a direction along arrow **710** to move pivotable element **612** between unlocked position **700** and a locked position (not
20 shown). This locked position for pivotable element **612** is depicted in **Figure 8** below.

With reference now to **Figure 8**, an illustration of latch **206** having locking mechanism **610** in a locked position is depicted in accordance with an illustrative embodiment. In this illustrative example, locking mechanism **610** is locked. In particular, pivotable element **612** has been rotated and moved into locked position **800**.
25 In locked position **800**, pivotable element **612** engages, or interfaces with, a groove in plurality of grooves **702** in adjustment member **500**. This type of engagement prevents rotation of adjustment member **500** about axis **511**.

The illustrations of sidewall **200** in **Figure 2** and latch **206** in **Figures 2-8** are not meant to imply physical or architectural limitations to the manner in which an illustrative
30 embodiment may be implemented. Other components in addition to or in place of the ones illustrated may be used. Some components may be optional.

The different components shown in **Figures 2-8** may be illustrative examples of how components shown in block form in **Figure 1** can be implemented as physical

structures. Additionally, some of the components in **Figures 2-8** may be combined with components in **Figure 1**, used with components in **Figure 1**, or a combination of the two.

With reference now to **Figure 9**, an illustration of a process for adjusting a latch is depicted in the form of a flowchart in accordance with an illustrative embodiment. The process illustrated in **Figure 9** may be implemented using latch **100** from **Figure 1** and/or latch **206** from **Figures 2-8**.

The process begins by inserting a first member having a first coupling element at least partially through a receiving area that extends through at least a portion of a latch body of the latch (operation **900**). Thereafter, the first member is moved along an axis through the receiving area such that a distance between the first coupling element and a second coupling element of a second member associated with the latch body changes (operation **902**), with the process terminating thereafter.

In this manner, the latch may be adjusted. The first coupling element and the second coupling element may be used for joining two panels together through the latch. Changing the distance between these two coupling elements may change a width of the gap between the two panels.

With reference now to **Figure 10**, an illustration of a process for attaching panels to each other using a latch is depicted in the form of a flowchart in accordance with an illustrative embodiment. The process illustrated in **Figure 10** may be implemented using latch **100** from **Figure 1** and/or latch **206** from **Figures 2-8**.

The process begins by inserting a first member having a first coupling element at least partially through a receiving area that extends through at least a portion of a latch body of a latch (operation **1000**). Next, a first panel is attached to the latch by engaging the first coupling element of the first member with a first attachment structure associated with a first panel (operation **1002**). Further, a second panel is attached to the latch by engaging a second coupling element of a second member associated with the latch body with a second attachment structure associated with the second panel (operation **1004**). In this manner, the first panel and the second panel may be joined together using the latch.

Thereafter, a determination may be made as to whether a width of a gap formed between the first panel and the second panel needs to be changed (operation **1006**). If the width of the gap does not need to be changed, an adjustment member that forms a

portion of the receiving area through which the first member has been inserted is locked in place using a locking mechanism (operation **1008**), with the process terminating thereafter.

If the width of the gap does need to be changed, the adjustment member is rotated relative to the first member to move the first member along an axis through the receiving area such that a distance between the first coupling element of the first member and the second coupling element of the second member changes, which in turn, changes the width of the gap formed between the first panel and the second panel (operation **1010**). The process then proceeds to operation **1008** as described above.

Illustrative embodiments of the disclosure may be described in the context of aircraft manufacturing and service method **1100** as shown in **Figure 11** and aircraft **1200** as shown in **Figure 12**. Turning first to **Figure 11**, an illustration of an aircraft manufacturing and service method in the form of a block diagram is depicted in accordance with an illustrative embodiment. During pre-production, aircraft manufacturing and service method **1100** may include specification and design **1102** of aircraft **1200** in **Figure 12** and material procurement **1104**.

During production, component and subassembly manufacturing **1106** and system integration **1108** of aircraft **1200** in **Figure 12** takes place. Thereafter, aircraft **1200** in **Figure 12** may go through certification and delivery **1110** in order to be placed in service **1112**. While in service **1112** by a customer, aircraft **1200** in **Figure 12** is scheduled for routine maintenance and service **1114**, which may include modification, reconfiguration, refurbishment, and other maintenance or service.

Each of the processes of aircraft manufacturing and service method **1100** may be performed or carried out by a system integrator, a third party, and/or an operator. In these examples, the operator may be a customer. For the purposes of this description, a system integrator may include, without limitation, any number of aircraft manufacturers and major-system subcontractors; a third party may include, without limitation, any number of vendors, subcontractors, and suppliers; and an operator may be an airline, a leasing company, a military entity, a service organization, and so on.

With reference now to **Figure 12**, an illustration of an aircraft in the form of a block diagram is depicted in which an illustrative embodiment may be implemented. In this example, aircraft **1200** is produced by aircraft manufacturing and service method **1100** in **Figure 11** and may include airframe **1202** with plurality of systems **1204** and

interior **1206**. Examples of systems **1204** include one or more of propulsion system **1208**, electrical system **1210**, hydraulic system **1212**, and environmental system **1214**. Any number of other systems may be included. Although an aerospace example is shown, different illustrative embodiments may be applied to other industries, such as the automotive industry.

Apparatuses and methods embodied herein may be employed during at least one of the stages of aircraft manufacturing and service method **1100** in **Figure 11**. For example, latches implemented in a manner similar to latch **100** from **Figure 1** and/or latch **206** from **Figures 2-8** may be used to install the sidewall for interior **1206** of aircraft **1200**. These latches may be used during component and subassembly manufacturing **1106**, system integration **1108**, and/or maintenance and service **1114**. Further, the different components that make up these latches may be manufactured and/or assembled during at least one of material procurement **1104** and component and subassembly manufacturing **1106**.

Using a latch similar to latch **100** from **Figure 1** and/or latch **206** from **Figures 2-8** may reduce the overall time needed for installing the sidewall for the interior of aircraft **1200**. Further, using these types of latches may be easier than using loose fasteners, screw guns, and/or other types of tools for installation, adjustment, and/or removal of panels for the sidewall. Still further, using these types of latches that allow the width of the gaps between the panels to be adjusted may increase the efficiency with which the sidewall may be installed.

In one illustrative example, components or subassemblies produced in component and subassembly manufacturing **1106** in **Figure 11** may be fabricated or manufactured in a manner similar to components or subassemblies produced while aircraft **1200** is in service **1112** in **Figure 11**. As yet another example, one or more apparatus embodiments, method embodiments, or a combination thereof may be utilized during production stages, such as component and subassembly manufacturing **1106** and system integration **1108** in **Figure 11**. One or more apparatus embodiments, method embodiments, or a combination thereof may be utilized while aircraft **1200** is in service **1112** and/or during maintenance and service **1114** in **Figure 11**. The use of a number of the different illustrative embodiments may substantially expedite the assembly of and/or reduce the cost of aircraft **1200**.

In this manner, the illustrative embodiments provide a method and apparatus adjusting a latch. The latch may comprise a latch body, a first member, and second member associated with the latch body. A receiving area extends through at least a portion of the latch body. The first member is configured to be at least partially received
5 within the receiving area. The first member has a first coupling element. The second member has a second coupling element. Movement of the first member along an axis through the receiving changes a distance between the first coupling element and the second coupling element. In this manner, the latch may be adjusted by changing the distance between the first coupling element and the second coupling element. Making
10 this adjustment may change the width of the gap formed between any two objects joined together using the latch.

The description of the different illustrative embodiments has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the embodiments in the form disclosed. Many modifications and variations will be
15 apparent to those of ordinary skill in the art. Further, different illustrative embodiments may provide different features as compared to other illustrative embodiments. The embodiment or embodiments selected are chosen and described in order to best explain the principles of the embodiments, the practical application, and to enable others of ordinary skill in the art to understand the disclosure for various embodiments
20 with various modifications as are suited to the particular use contemplated.

What is claimed is:

1. An apparatus comprising:

a latch body (106), wherein a receiving area (118) extends through at least a portion of the latch body (106);

a first member (112) configured to be at least partially received within the receiving area (118) of the latch body (106), wherein the first member (112) has a first coupling element (154); and

a second member (108) associated with the latch body (106), wherein the second member (108) has a second coupling element (156) and wherein movement of the first member (112) along an axis (120) through the receiving area (118) changes a distance between the first coupling element (154) and the second coupling element (156).

2. The apparatus of claim 1 further comprising:

an adjustment member (110) configured to form a portion of the receiving area (118) and receive at least a portion of the first member (112) and wherein relative rotation between the adjustment member (110) and the first member (112) causes the first member (112) to move along the axis (120).

3. The apparatus of claim 2, wherein the adjustment member (110) is a separate component positioned relative to the latch body (106) and configured to be held within a retaining area (116) formed by the latch body (106) such that a channel through the latch body (106) opens into a hole within the adjustment member (110) to form the receiving area (118).

4. The apparatus of claim 2 or 3, wherein the first member (112) has outer threads (122) configured to engage inner threads (124) along a hole in the adjustment member (110).

5. The apparatus of claim 2, 3 or 4 further comprising:

a locking mechanism (114) comprising:

a pivotable element (142), wherein rotation of the pivotable element (142) into a locked position locks the adjustment member (110) in place to prevent the relative rotation between the adjustment member (110) and the first member (112) and wherein rotation of the pivotable element (142) into an unlocked position unlocks the adjustment member (110) to allow the relative rotation between the adjustment member (110) and the first member (112).

6. The apparatus of any of claims 1 to 5, wherein the first member (112) comprises: a stop feature (132) configured to enter a control area (126) within the latch body (106) when the first member (112) enters the receiving area within the latch body (106), wherein the control area (126) has an open end (128) and a closed end (130).

7. The apparatus of claim 6 further comprising: an end element (134) configured for association with the latch body (106), wherein the end element (134) is used to close the open end (128) of the control area (126) with the stop feature (132) of the first member (112) located within the control area (126) such that a distance by which the first member (112) can be moved along the axis (120) is determined by a length of the control area (126).

8. The apparatus of any of claims 1 to 7, wherein a first attachment structure (150) is configured to engage the first coupling element (154) of the first member (112) and a second attachment structure (152) is configured to engage the second coupling element (156) of the second member (108).

9. The apparatus of claim 8, wherein the first attachment structure (150) comprises a first hook (158) configured to engage the first coupling element (154) of the first member (112) and the second attachment structure (152) comprises a second hook (160) configured to engage the second coupling element (156) of the second member (108).

10. The apparatus of claim 8 or 9, wherein the first attachment structure (150) is associated with a first panel (102) and wherein the second attachment structure (152) is associated with a second panel (104).

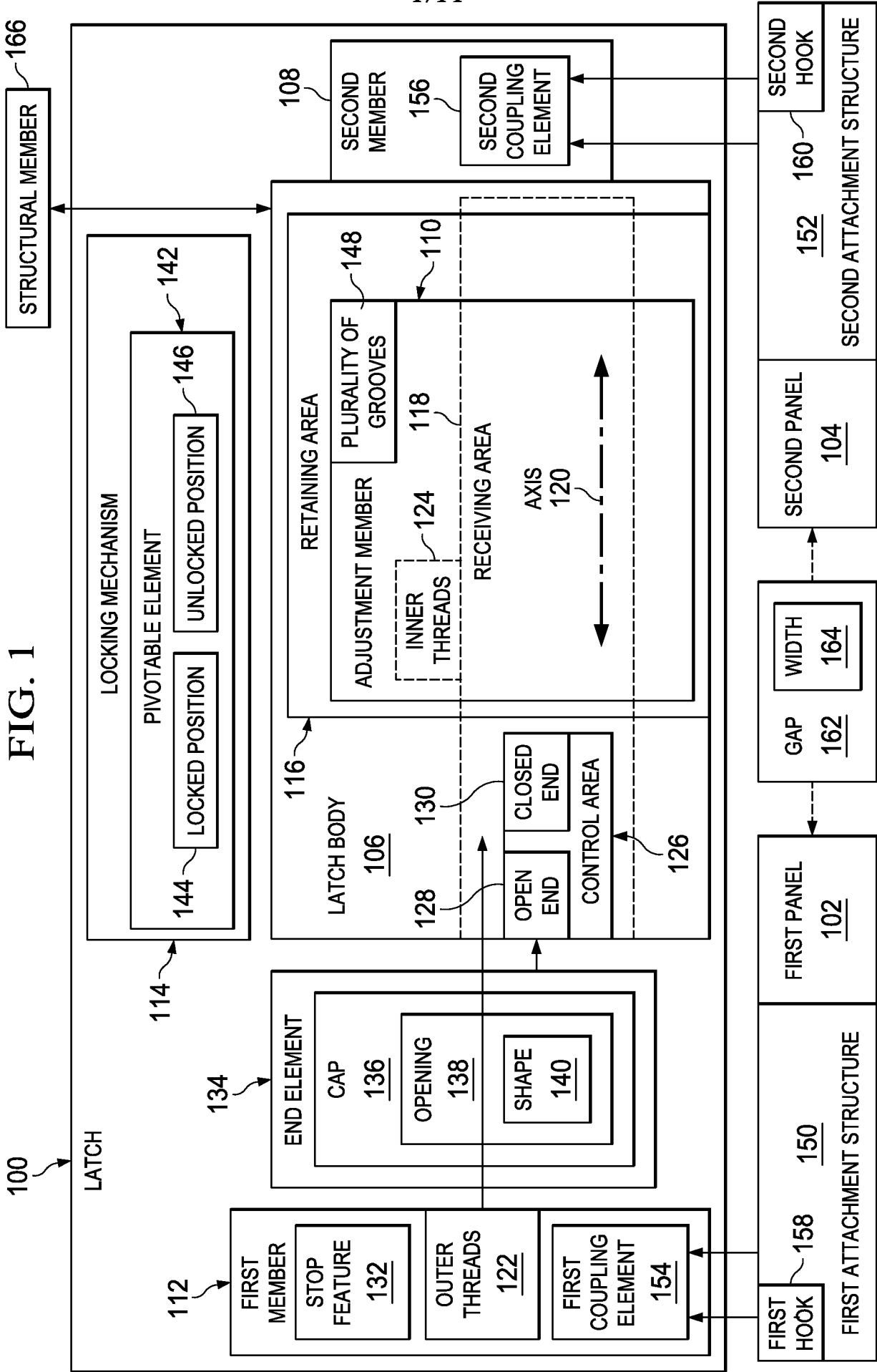
11. The apparatus of claim 10 or 11, wherein the latch body (106) is configured for attachment to a structural member (166) such that the first panel (102) and the second panel (104) are associated with the structural member (166).

12. The apparatus of any of claims 1 to 11, wherein the first coupling element (154) is a first elongated portion of the first member (112) configured to receive a first hook (158) and the second coupling element (156) is a second elongated portion of the second member (108) configured to receive a second hook (160).

13. A method for adjusting a latch (100), the method comprising:
inserting a first member (112) having a first coupling element (154) at least partially through a receiving area (118) that extends through at least a portion of a latch body (106) of the latch (100); and
moving the first member (112) along an axis (120) through the receiving area (118) by rotating the first member (112) relative to an adjustment member (110) that forms a portion of the receiving area (118) such that a distance between the first coupling element (154) and a second coupling element (156) of a second member (108) associated with the latch body (106) changes.

14. The method of claim 13 further comprising:
engaging the first coupling element (154) of the first member (112) with a first attachment structure (150) associated with a first panel (102);
engaging the second coupling element (156) of the second member (108) with a second attachment structure (152) associated with a second panel (104); and
moving the first member (112) along the axis (120) through the receiving area (118) to change the distance between the first coupling element (154) and the second coupling element (156) such that a width of a gap between the first panel (102) and the second panel (104) changes.

15. An aircraft (1200) comprising the apparatus of any of claims 1 to 12.



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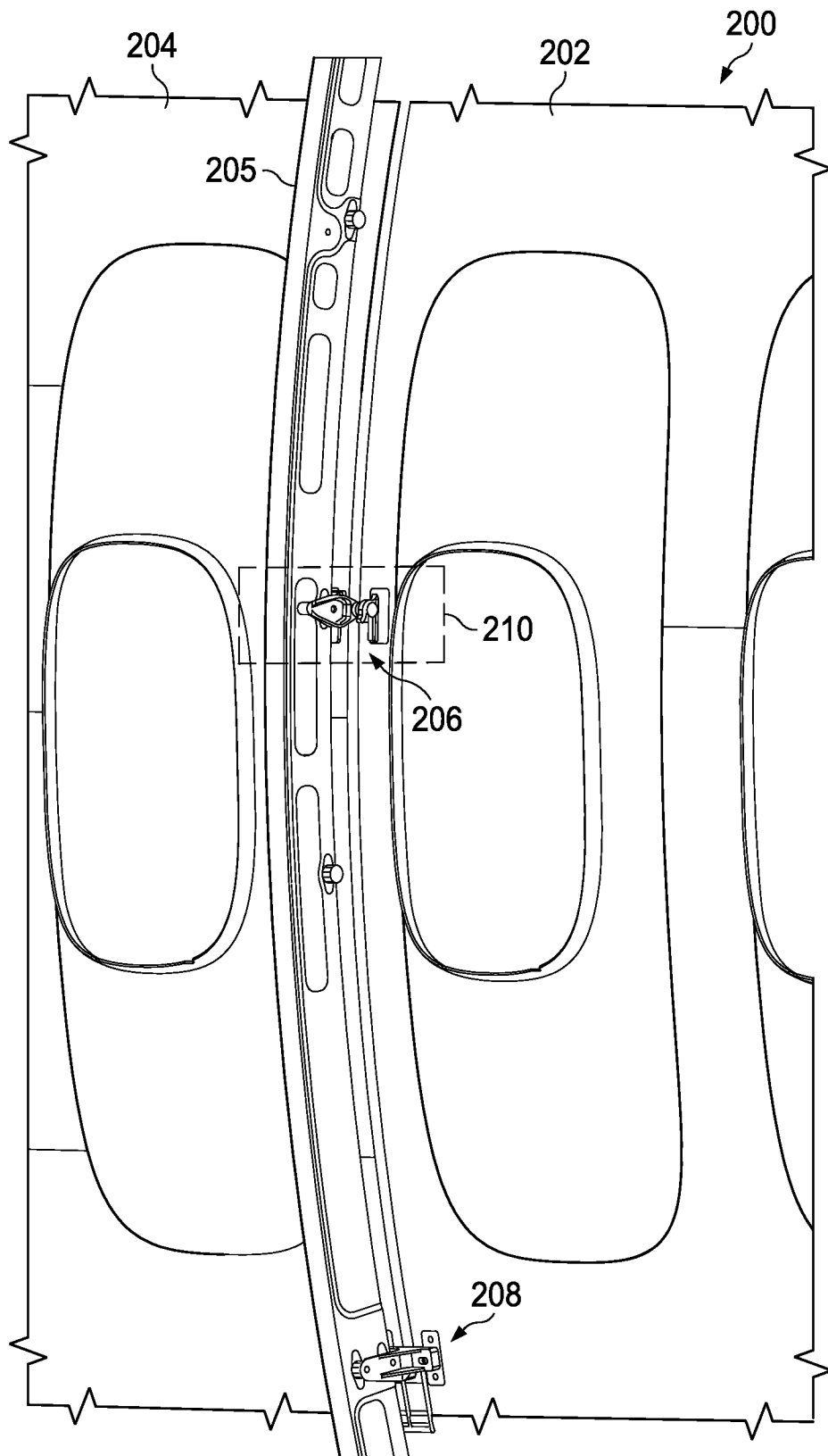
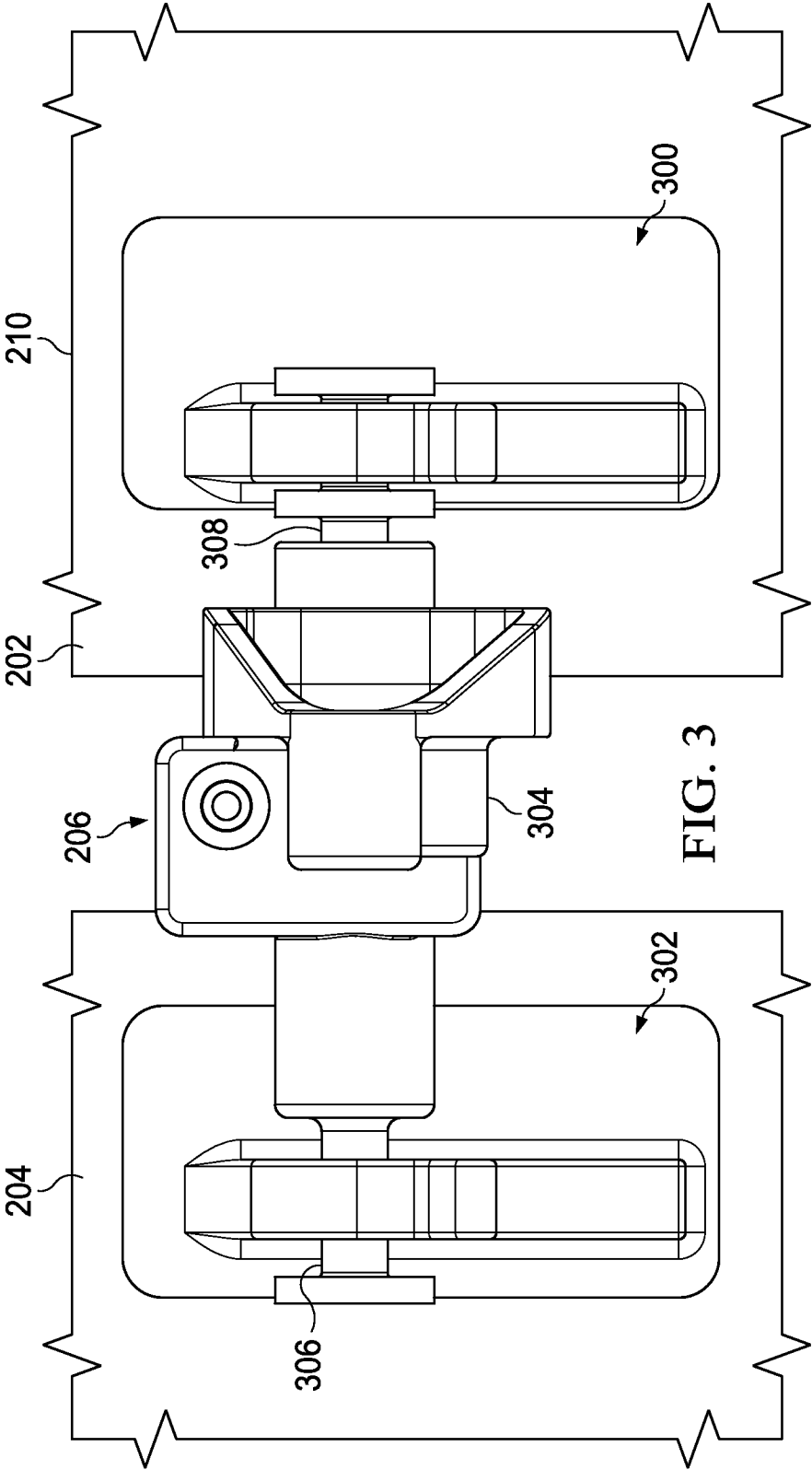
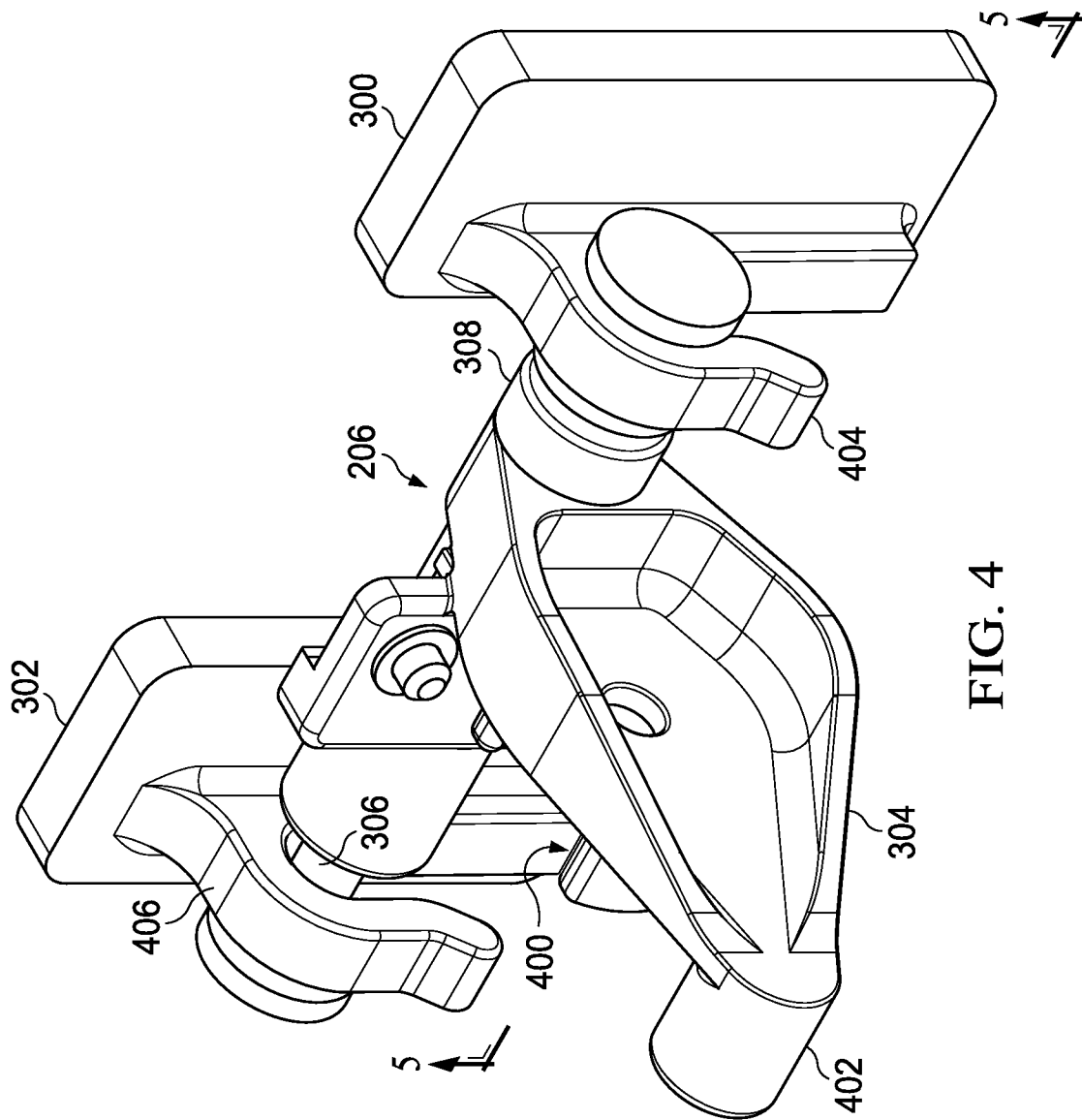


FIG. 2





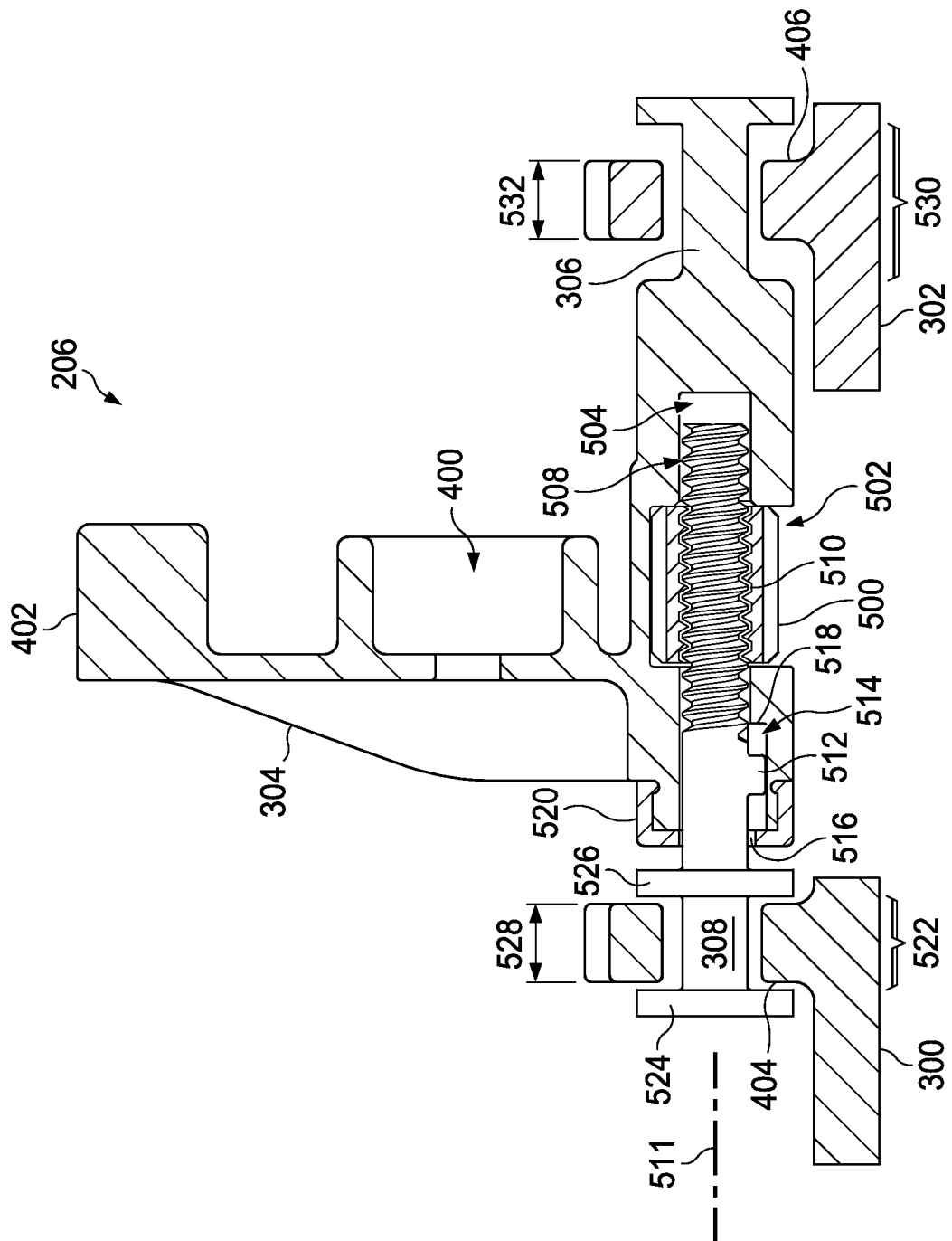
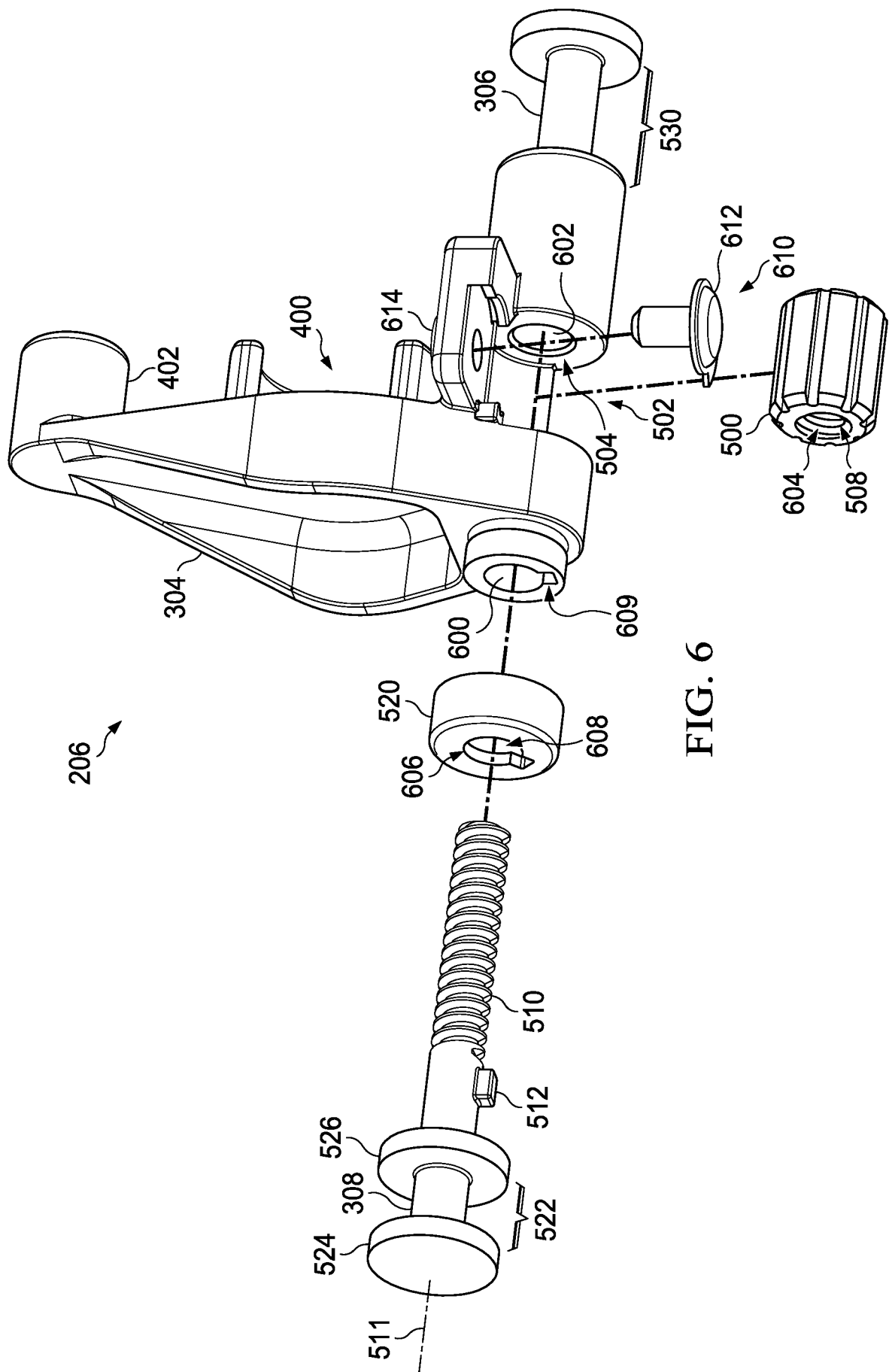


FIG. 5

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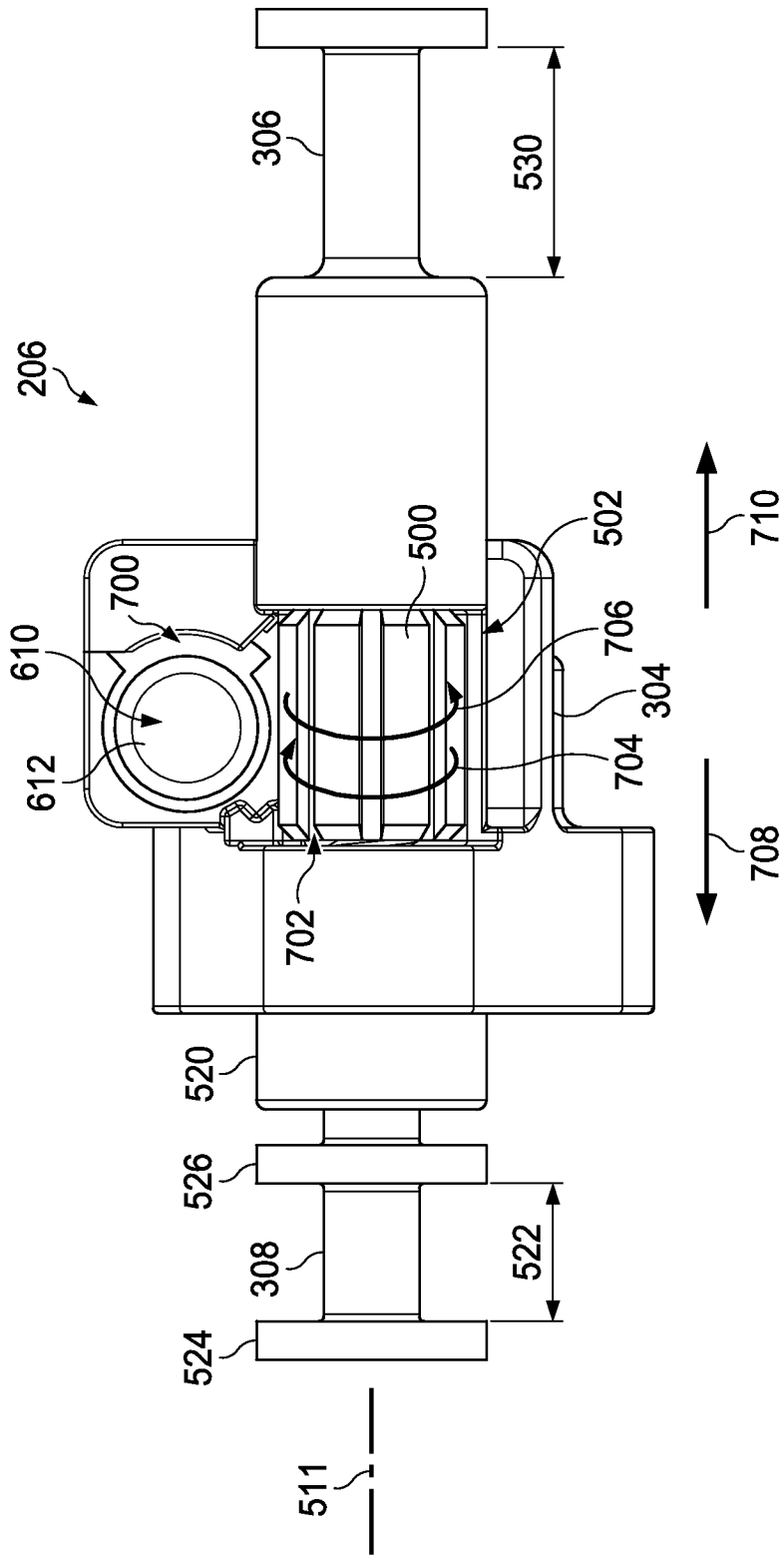


FIG. 7

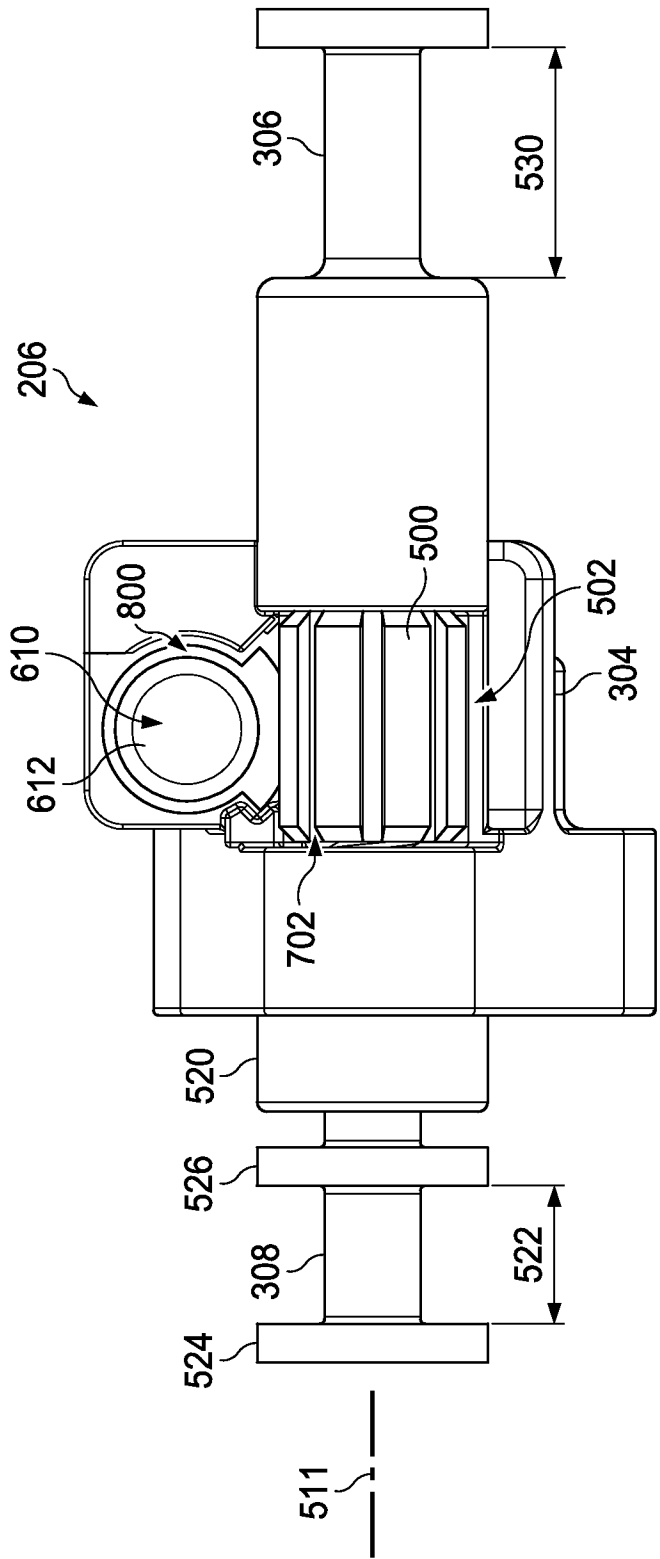


FIG. 8

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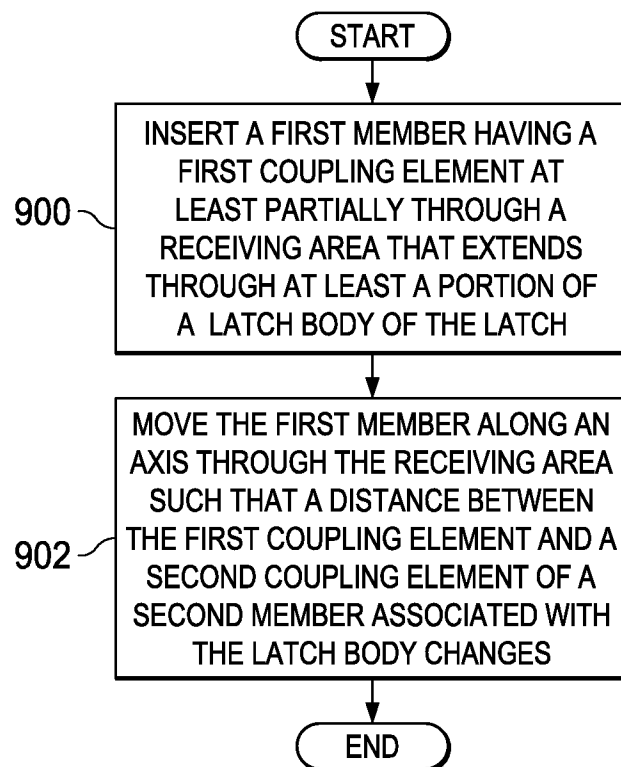


FIG. 9

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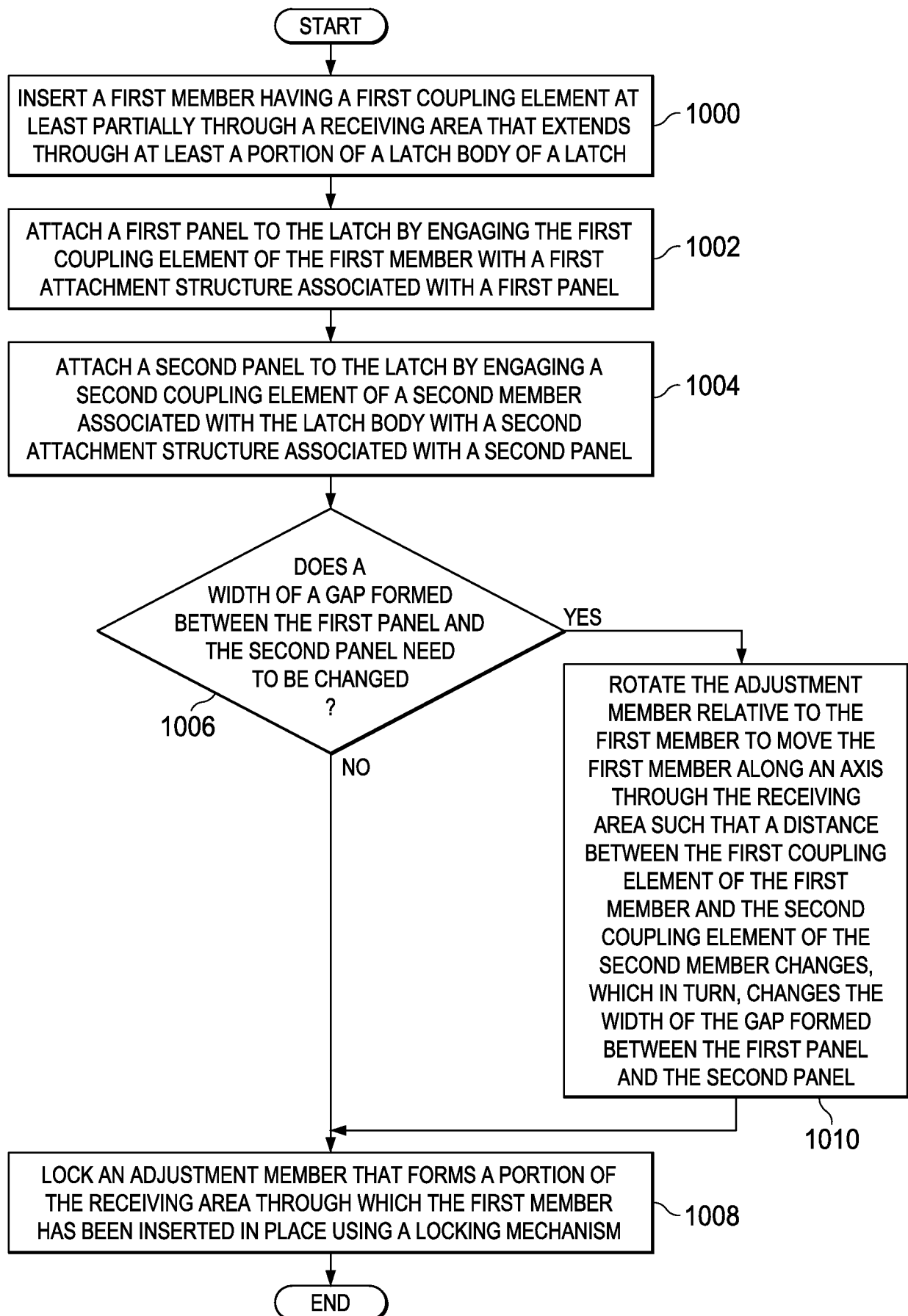
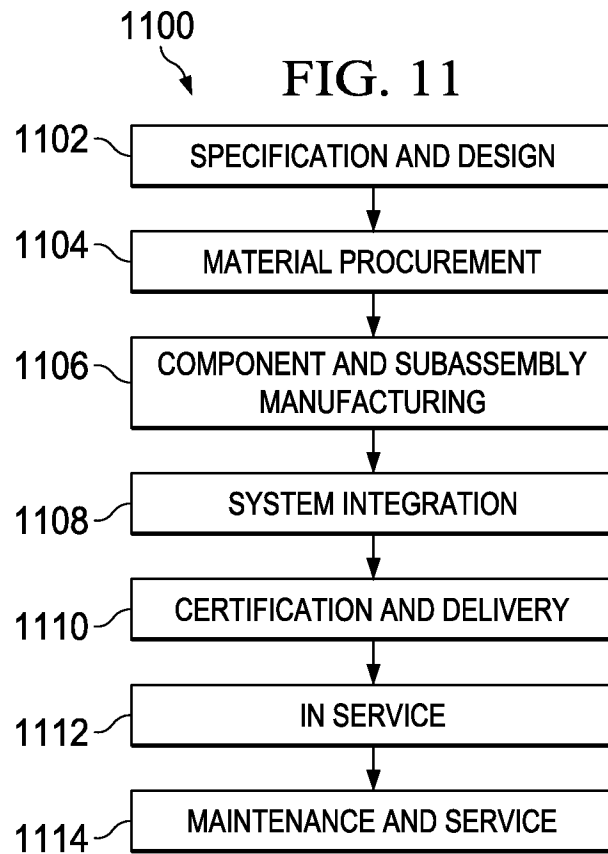
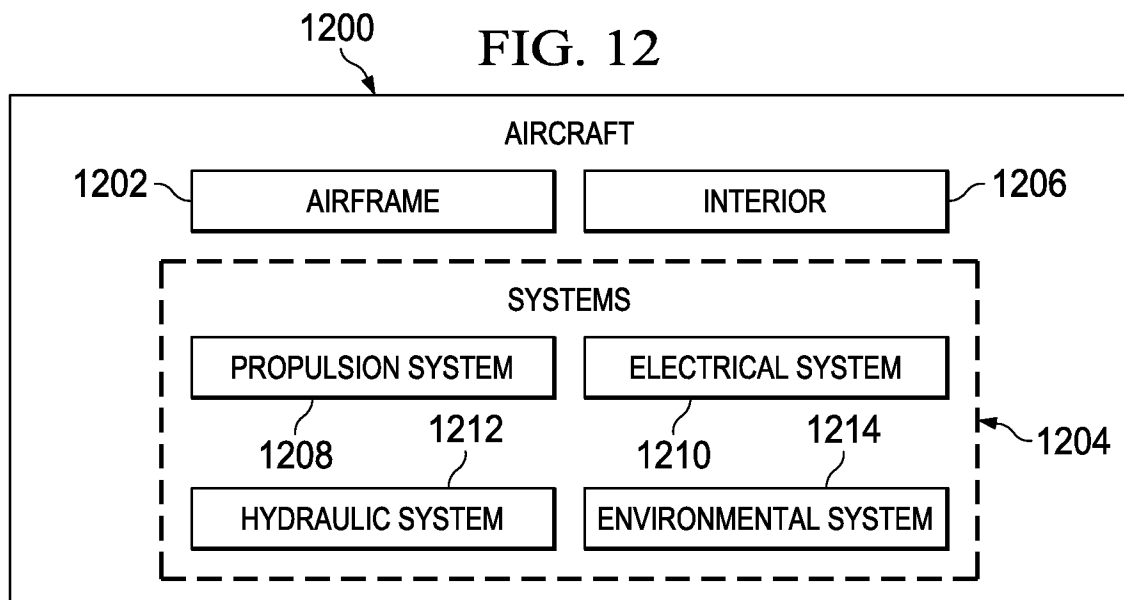


FIG. 10

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/024895

A. CLASSIFICATION OF SUBJECT MATTER
INV. B64C1/06 F16B5/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B64C F16B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 538 757 A (BRATTHAUER CLIFFORD C ET AL) 23 January 1951 (1951-01-23) figures	1-15
A	----- WO 2010/100057 A2 (SFS INTEC HOLDING AG [CH]; COSTABEL SASCHA [DE]; SCHMIDT MARKUS [DE]) 10 September 2010 (2010-09-10) -----	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

12 August 2014

Date of mailing of the international search report

21/08/2014

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/024895

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2538757	A	23-01-1951	NONE	

WO 2010100057	A2	10-09-2010	DE 102009011904 A1	16-09-2010
			EP 2403754 A2	11-01-2012
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			WO 2010100057 A2	10-09-2010
