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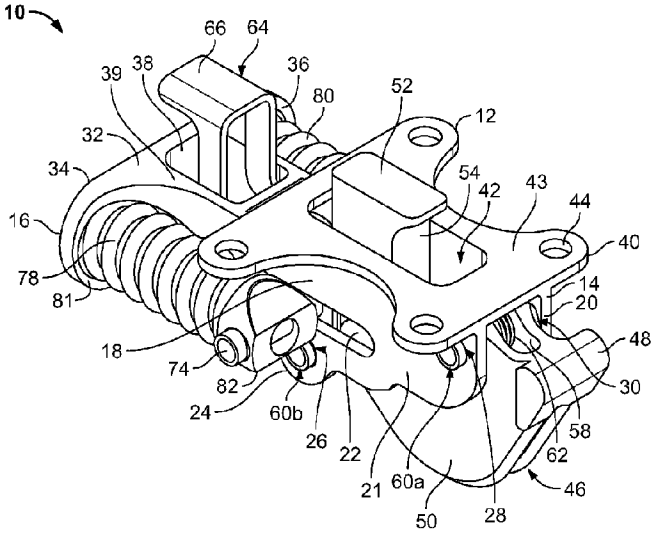

(57) Abrégé/Abstract:
A latch (10) including a housing (12) having side members (18, 20) each having an elongated slot (22), a bolt (46) mounted rotatably to the housing (12) and positioned between the side members (18, 20) of the housing (12), a trigger (64) mounted rotatably to the housmg (12), and a pin (74) and roller (76) positioned slidably withm the elongated slots (22) of the side members (18, 20) of the housing (12) The bolt (46) is moveable between a first, closed position and a second open position The trigger (64) is moveable between a first position, in which the pin (74) and roller (76) are engaged with the bolt (46) when the bolt (46) is m its first position, and a second position, m which the pin (74) and roller (76) are disengaged from the bolt (46) The latch (10) can be opened automatic- ally when a defined load is provided on the bolt (46), or manually by depressmg the trigger (64) to disengage the pin (74) and roller (76) from the bolt (46)

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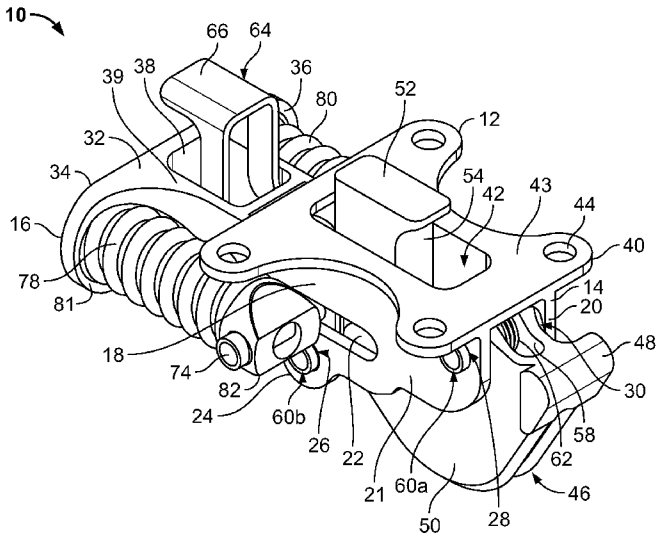

FIG. 1

(57) Abstract: A latch (10) including a housing (12) having side members (18, 20) each having an elongated slot (22), a bolt (46) mounted rotatably to the housing (12) and positioned between the side members (18, 20) of the housing (12), a trigger (64) mounted rotatably to the housing (12), and a pin (74) and roller (76) positioned slidably within the elongated slots (22) of the side members (18, 20) of the housing (12). The bolt (46) is moveable between a first, closed position and a second open position. The trigger (64) is moveable between a first position, in which the pin (74) and roller (76) are engaged with the bolt (46) when the bolt (46) is in its first position, and a second position, in which the pin (74) and roller (76) are disengaged from the bolt (46). The latch (10) can be opened automatically when a defined load is provided on the bolt (46), or manually by depressing the trigger (64) to disengage the pin (74) and roller (76) from the bolt (46).

WO 2017/023788 A1

PRESSURE RELIEF LATCH

Cross-Reference to Related Application

This application relates to and claims the benefit of commonly owned, co-pending U.S. Provisional Patent Application Serial No. 62/200,971, filed August 4, 2015.

Technical Field of the Invention

The present invention relates to latches and, more particularly, pressure relief latches.

Background of the Prior Art

Removable and moveable elements installed on exterior surfaces of aerospace vehicles, such as hatches, doors, access panels, engine cowlings, nacelles, and radomes employ latches. What is desirable is a latch that can be opened or closed manually or it can be opened automatically when a defined load is reached.

Disclosure of the Invention

In an embodiment, a latch includes a housing having a first end, a second end opposite the first end, first and second side members, each of which includes an outer surface, an inner surface, and an elongated slot extending from the outer surface to the inner surface and between the first and second ends, the first and second side

members forming a space between the inner surfaces thereof, a base portion positioned at the second end and including first and second coves, each of which is positioned adjacent to an outer surface of a corresponding one of the first and second side members, the base portion including a first slot located intermediate the first and second coves and extending to the space, and a mounting portion positioned at the first end and including a second slot and extending to the space; a bolt mounted rotatably to the housing proximate to the first end thereof and positioned between the first and second side members of the housing, the bolt including a curvilinear portion, a first end located on the curvilinear portion, a linear portion, and a second end located on the linear portion, the bolt being moveable rotatably between a first position, in which the linear portion of the bolt extends through the space and the second end of the bolt extends through and protrudes from the second slot of the mounting portion of the housing, and a second position, in which the curvilinear portion of the bolt extends through and protrudes from the second slot and the linear portion is positioned external of the second slot; a trigger mounted rotatably to the housing, the trigger including a first end protruding from the first slot of the base portion of the housing, a second end, and a trigger slot formed within the second end of the trigger; first and second compression springs, one of which is positioned within the first cove of the housing and the other of which is positioned within the second cove of the housing, each of the first and second compression springs including an end cap; and a pin and roller extending through the end caps of the first and second compression springs and the trigger slot of the trigger, the pin and roller being positioned slidably within the elongated slots of the first and second side members of the housing, wherein the trigger is moveable between a first

position, in which the pin and roller is engaged with the bolt when the bolt is in its first position, and a second position, in which the pin and roller is disengaged from the bolt.

In an embodiment, the bolt includes a notch formed within the linear portion thereof and adjacent to one end of the curvilinear portion, and wherein the bolt notch is adapted to receive the pin and roller when the bolt is in its first position. In an embodiment, the bolt is mounted rotatably to the housing by a rivet. In an embodiment, the bolt includes a slot formed within the first end of the bolt and a torsion spring positioned on the rivet and within the slot of the bolt. In an embodiment, the trigger is mounted to the housing by a rivet. In an embodiment, the latch is adapted to be operated manually by providing a force on the first end of the trigger to rotate the trigger from its first position to its second position, thereby disengaging the pin and roller away from the bolt notch of the bolt. In an embodiment, the bolt is retained in its second position by the torsion spring. In an embodiment, the bolt is adapted to be rotated from its second position to its first position by providing pressure on the first end of the bolt and rotating the bolt to make contact with the pin and roller and pushing to pin and roller away until the pin and roller engages the notch of the bolt. In an embodiment, the bolt is adapted to be rotated from its first position to its second position when a defined load is provided on the first end of the bolt, such that the bolt pushes the pin and roller in the elongated slots of the side members of the housing and loaded by the compression springs. In an embodiment, the bolt is retained in its second position by the torsion spring. In an embodiment, the bolt is adapted to be rotated from its second position to its first position by providing pressure on the first end of the bolt and rotating the bolt to

make contact with the pin and roller and pushing to pin and roller away until the pin and roller engages the notch of the bolt.

In another embodiment, a latch includes a housing having a first end, a second end opposite the first end, first and second side members, each of which includes an outer surface, an inner surface, and an elongated slot extending from the outer surface to the inner surface and between the first and second ends, the first and second side members forming a space between the inner surfaces thereof, a base portion positioned at the second end and including first and second coves, each of which is positioned adjacent to an outer surface of a corresponding one of the first and second side members, the base portion including a first slot located intermediate the first and second coves and extending to the space, and a mounting portion positioned at the first end and including a second slot and extending to the space; a bolt mounted rotatably to the housing proximate to the first end thereof and positioned between the first and second side members of the housing, the bolt including a curvilinear portion, a first end located on the curvilinear portion, a linear portion, and a second end located on the linear portion, the bolt being moveable rotatably between a first position, in which the linear portion of the bolt extends through the space and the second end of the bolt extends through and protrudes from the second slot of the mounting portion of the housing, and a second position, in which the curvilinear portion of the bolt extends through and protrudes from the second slot and the linear portion is positioned external of the second slot; and a pin and roller positioned slidably within the elongated slots of the first and second side members of the housing.

Brief Description of the Drawings

FIG. 1 is a top perspective view of an embodiment of a pressure relief latch shown in a closed position;

FIG. 2 is a bottom perspective view of the pressure relief latch shown in **FIG. 1**;

FIG. 3 is a side cross-sectional view of the pressure relief latch shown in **FIG. 1**;

FIG. 4 is a top perspective view of the pressure relief latch shown in **FIG. 1**, showing areas for opening the latch from its closed position;

FIG. 5 is a top perspective view of the pressure relief latch shown in **FIGS. 1** through **3,** with the latch shown in an open position;

FIG. 6 is a side cross-sectional view of the pressure relief latch shown in **FIG. 5**; and

FIG. 7 is a side cross-sectional view of the pressure relief latch shown in **FIG. 2,** with a trigger employed by the latch shown in a depressed position.

Best Mode Of Carrying Out The Invention

Referring to **FIGS. 1** through **3,** in an embodiment, a pressure relief latch **10** includes a housing **12** having a first end **14** and a second end **16** opposite the first end **14**. The housing **12** includes first and second side members **18, 20**, each of which extends from the first end **14** to the second end **16** and includes an outer surface **21,** an inner surface **23** opposite the outer surface **21,** and an elongated slot **22** extending from the outer surface **21** to the inner surface **23** and intermediate the first and second ends **14, 16**. Each of the side members **18, 20** further includes a tab **24** having a first hole **26** extending from the outer surface **21** to the inner surface **23** and a second hole **28**

located proximate to the first end **14** and extending from the outer surface **21** to the inner surface **23.** A space **30** is formed between the inner surfaces **23** of the first and second side members **18, 20**. In an embodiment, the housing **12** further includes a base portion **32** formed at the second end **16** thereof. The base portion **32** includes first and second coves **34, 36** each of which is positioned adjacent to the outer surface **21** of a corresponding one of the first and second side members **18, 20**. The base portion **32** further includes a slot **38** located intermediate the coves **34, 36** and extending from an upper surface **39** of the base portion **32** to the space **30**. In an embodiment, the slot **38** is substantially rectangular in shape. The housing **12** further includes a mounting portion **40** having a slot **42** that extends from an upper surface **43** of the mounting portion **40** to the space **30**, and a plurality of mounting holes **44**. In an embodiment, the slot **42** is substantially rectangular in shape.

In an embodiment, the pressure relief latch **10** includes a bolt **46**. In an embodiment, the bolt **46** is J-shaped. In other embodiments, the bolt **46** can have a U-shape or any other suitable shape. In an embodiment, the bolt **46** includes a first end **48** located on an arcuate/curvilinear portion **50** and a second end **52** located on a linear portion **54**. In an embodiment, the bolt **46** includes a bolt notch **56** formed within the linear portion **54** and adjacent to one end of the curvilinear portion **50**. A slot **58** is formed within the first end **48** of the bolt **46**. In an embodiment, the bolt **46** is mounted rotatably to the housing **12** such that the first end **48** of the bolt **46** is mounted to the first end **14** of the housing **12** by a rivet **60a**, which is inserted within the hole **28**. In an embodiment, the linear portion **54** of the bolt **48** extends through the space **30** when the bolt **46** is in a first position, and the second end **52** of the bolt **46** extends through and

protrudes from the slot **42** of the mounting portion **40** when the bolt **48** is in its first position. A torsion spring **62** is positioned on the rivet **60a** and within the slot **58** of the bolt **46**.

In an embodiment, the pressure relief latch **10** includes a trigger **64**. In an embodiment, the trigger **64** is substantially "Z" in shape. In other embodiments, the trigger **64** includes other suitable shapes and sizes. In an embodiment, the trigger **64** includes a first end **66** and a second end **68**. The second end **68** of the trigger **64** includes trigger slot **70** and a hole **72** (see **FIG. 3**). In an embodiment, the trigger **64** is mounted rotatably to the housing **12** such that the second end **68** of the trigger **64** is mounted to the holes **26** of the tabs **24** of the housing **12** by another rivet **60b** extending through the hole **72**, and a pin **74** having a roller **76** mounted thereon extending through the trigger slot **70** and the elongated slots **22** of the side members **18, 20**. The first end **66** of the trigger **64** extends through and protrudes from the slot **38** of the base portion **32.** In an embodiment, the pin **74** and the roller **76** combination are sized and shaped to engage the bolt notch **56** of the bolt **46** when the latch **10** is in its closed position.

In an embodiment, the pressure relief latch **10** includes first and second compression springs **78, 80** each of which is positioned within a corresponding one of the coves **34, 36** of the base portion **32** of the housing **12**. One end of each of the springs **78, 80** is positioned against a rear interior portion **81** of a corresponding one of the coves **34, 36** of the base portion **32,** while the other end of each of the springs **78, 80** includes a corresponding side cap **82** mounted thereon, which receives the pin **74** and the roller **76** combination.

FIG. 4 shows the areas on the latch **10** where it can be opened. That is, the latch **10** can be opened manually by a human finger (or other implement) on the first end **66** of the trigger **64**, or it can be opened automatically when a defined load is reached on the first end **48** on the bolt **46**.

Referring to **FIGS. 5** and **6,** in an embodiment, the latch **10** may be opened from its first, closed position to its second, open position under a defined load. As an example of a "defined load," when pressure builds up and reaches a defined pressure inside an engine compartment, the latch **10** pushes the engine compartment door open to release the pressure. When the defined load is reached, the bolt **46** rotates clockwise and pushes the roller **76**, which is guided by the pin **74**, in the elongated slots **22** of the side members **18, 20** of the housing **12** toward the second end **16** of the housing **12,** and loaded by the compression springs **78, 80** away until the bolt **46** disengages the bolt notch **56** and stops. The bolt **46** is retained in its open position under the load of the torsion spring **62** acting thereon. In this regard, the trigger slot **70** allows the pin **74** and the roller **76** to move only in one direction, which is a direction away from the bolt **46** and toward the second end **16** of the housing **12.**

Referring to **FIG. 7**, in an embodiment, the latch **10** may be opened from its first, closed position to its second, open position manually. From its closed position, the latch **10** can be opened by finger pressure on the first end **66** of the trigger **64**, which pivots about the rivet **60b** and rotates counterclockwise. In this regard, the trigger **64** pulls the pin **74** and roller **76** away from the bolt notch **56** of the bolt **46** until they disengage one another, thereby enabling the bolt **46** to automatically rotate counterclockwise under the load of the torsion spring **62** and is retained in open position.

In an embodiment, from its open position, the latch **10** can be closed manually by finger pressure on the second end **52** of the bolt **46**, which pivots about the rivet **60a** to rotate counterclockwise. In this regard, when the bolt **46** makes contact with the roller **76**, the bolt **46** pushes the pin **74** and roller **76** away until the roller **76** engages the bolt notch **56** of the bolt **46.** The bolt **46** is then retained in closed position.

It should be understood that the embodiments described herein are merely exemplary and that a person skilled in the art may make many variations and modifications without departing from the spirit and scope of the invention. All such variations and modifications are intended to be included within the scope of the invention as defined in the appended claims.

CLAIMS

What is claimed is:

1. A latch, comprising:

a housing having a first end, a second end opposite the first end, first and second side members, each of which includes an outer surface, an inner surface, and an elongated slot extending from the outer surface to the inner surface and between the first and second ends, the first and second side members forming a space between the inner surfaces thereof, a base portion positioned at the second end and including first and second coves, each of which is positioned adjacent to an outer surface of a corresponding one of the first and second side members, the base portion including a first slot located intermediate the first and second coves and extending to the space, and a mounting portion positioned at the first end and including a second slot and extending to the space;

a bolt mounted rotatably to the housing proximate to the first end thereof and positioned between the first and second side members of the housing, the bolt including a curvilinear portion, a first end located on the curvilinear portion, a linear portion, and a second end located on the linear portion, the bolt being moveable rotatably between a first position, in which the linear portion of the bolt extends through the space and the second end of the bolt extends through and protrudes from the second slot of the mounting portion of the housing, and a second position, in which the curvilinear portion of the bolt extends through and protrudes from the second slot and the linear portion is positioned external of the second slot;

a trigger mounted rotatably to the housing, the trigger including a first end protruding from the first slot of the base portion of the housing, a second end, and a trigger slot formed within the second end of the trigger;

first and second compression springs, one of which is positioned within the first cove of the housing and the other of which is positioned within the second cove of the housing, each of the first and second compression springs including an end cap; and

a pin and roller extending through the end caps of the first and second compression springs and the trigger slot of the trigger, the pin and roller being positioned slidably within the elongated slots of the first and second side members of the housing,

wherein the trigger is moveable between a first position, in which the pin and roller is engaged with the bolt when the bolt is in its first position, and a second position, in which the pin and roller is disengaged from the bolt.

2. The latch of Claim 1, wherein the bolt includes a notch formed within the linear portion thereof and adjacent to one end of the curvilinear portion, and wherein the bolt notch is adapted to receive the pin and roller when the bolt is in its first position.

3. The latch of Claim 2, wherein the bolt is mounted rotatably to the housing by a rivet.

4. The latch of Claim 3, wherein the bolt includes a slot formed within the first end of the bolt and a torsion spring positioned on the rivet and within the slot of the bolt.

5. The latch of Claim 4, wherein the trigger is mounted to the housing by a rivet.

6. The latch of Claim 5, wherein the latch is adapted to be operated manually by providing a force on the first end of the trigger to rotate the trigger from its first position to its second position, thereby disengaging the pin and roller away from the bolt notch of the bolt.

7. The latch of Claim 6, wherein the bolt is retained in its second position by the torsion spring.

8. The latch of Claim 7, wherein the bolt is adapted to be rotated from its second position to its first position by providing pressure on the second end of the bolt and rotating the bolt to make contact with the pin and roller and pushing to pin and roller away until the pin and roller engages the notch of the bolt.

9. The latch of Claim 4, wherein the bolt is adapted to be rotated from its first position to its second position when a defined load is provided on the first end of the bolt, such that the bolt pushes the pin and roller in the elongated slots of the side members of the housing and loaded by the compression springs.

10. The latch of Claim 9, wherein the bolt is retained in its second position by the torsion spring.

11. The latch of Claim 10, wherein the bolt is adapted to be rotated from its second position to its first position by providing pressure on the second end of the bolt and rotating the bolt to make contact with the pin and roller and pushing to pin and roller away until the pin and roller engages the notch of the bolt.

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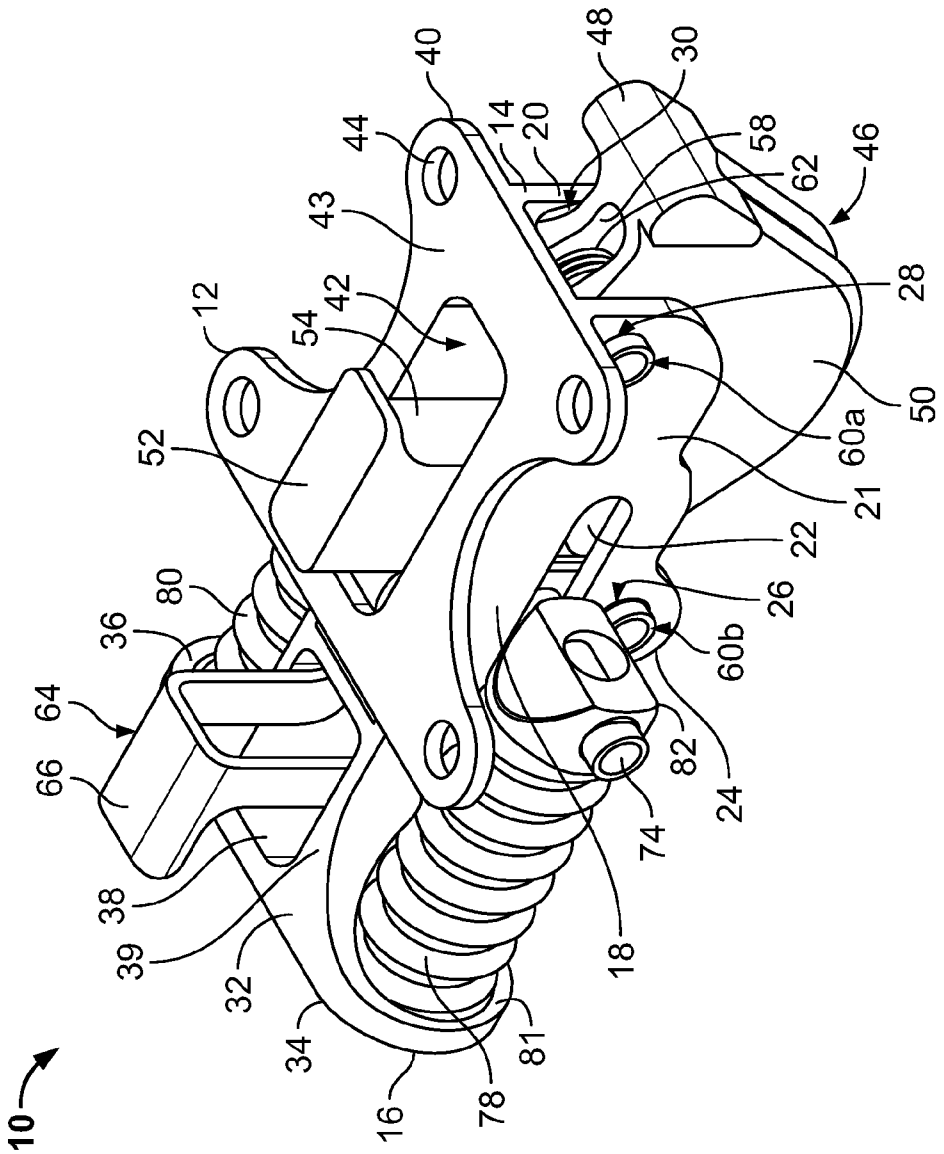
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FIG. 1

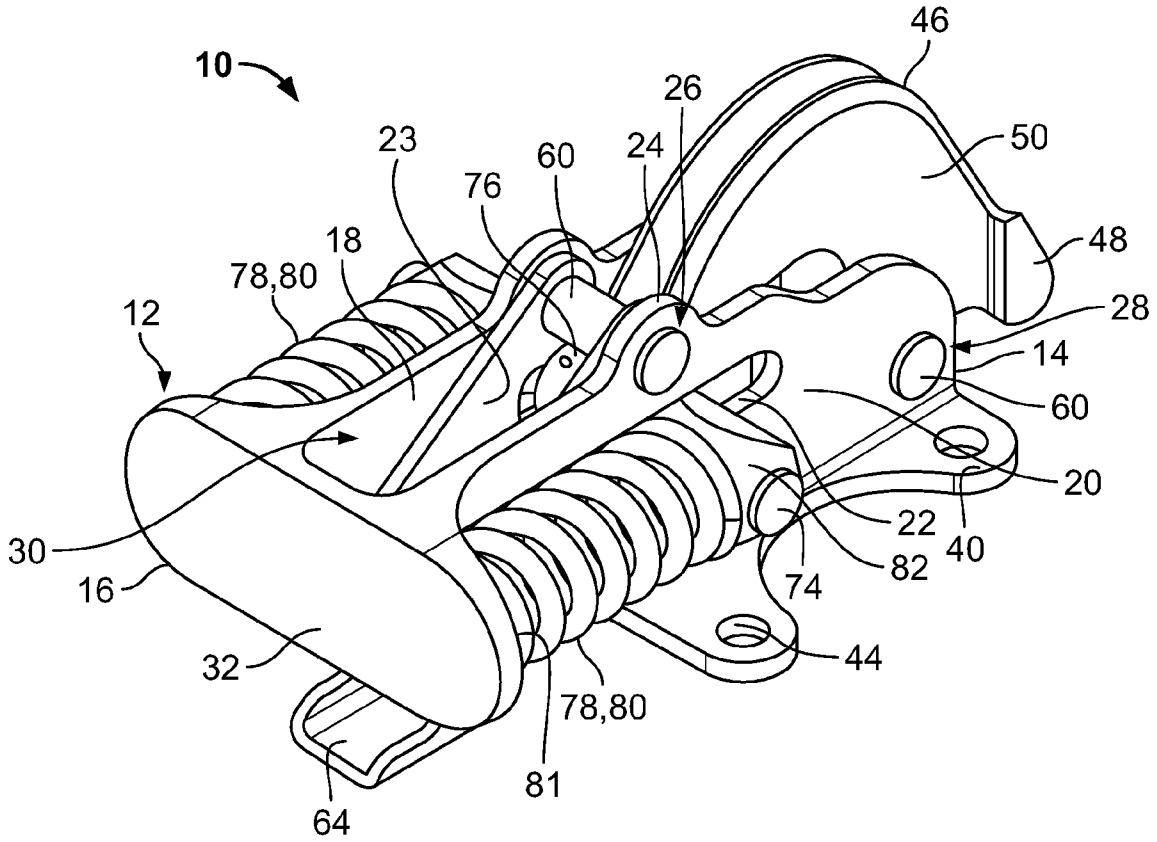
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FIG. 2

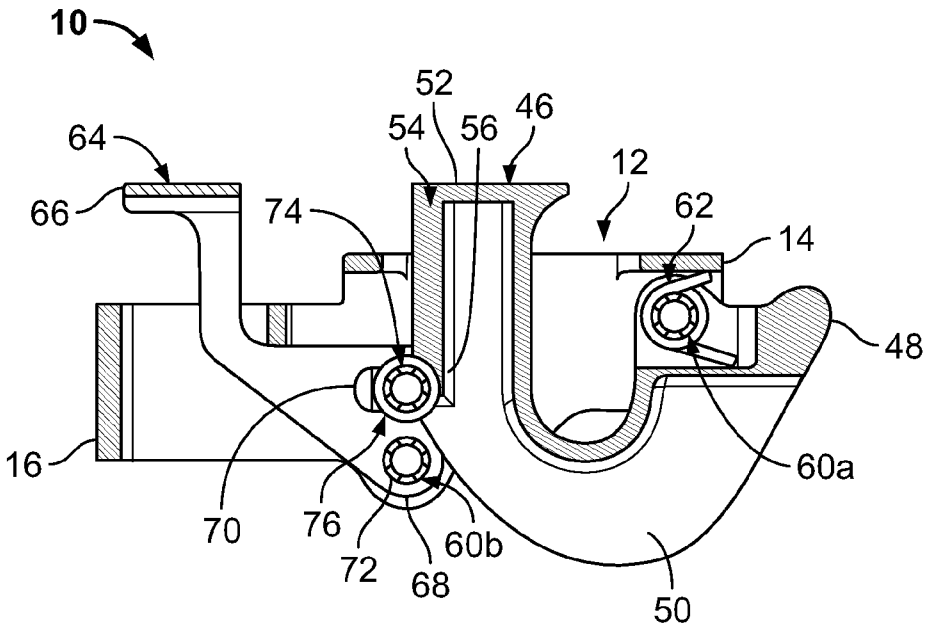
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FIG. 3

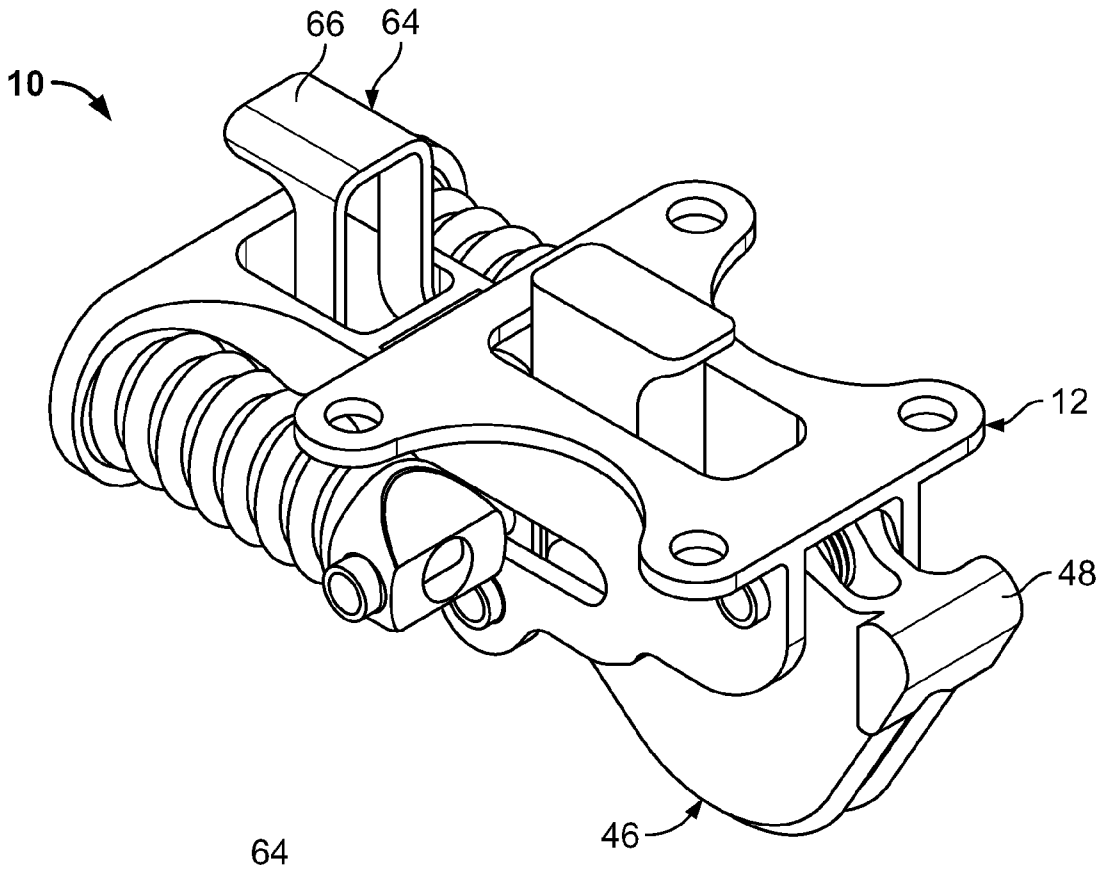

FIG. 4

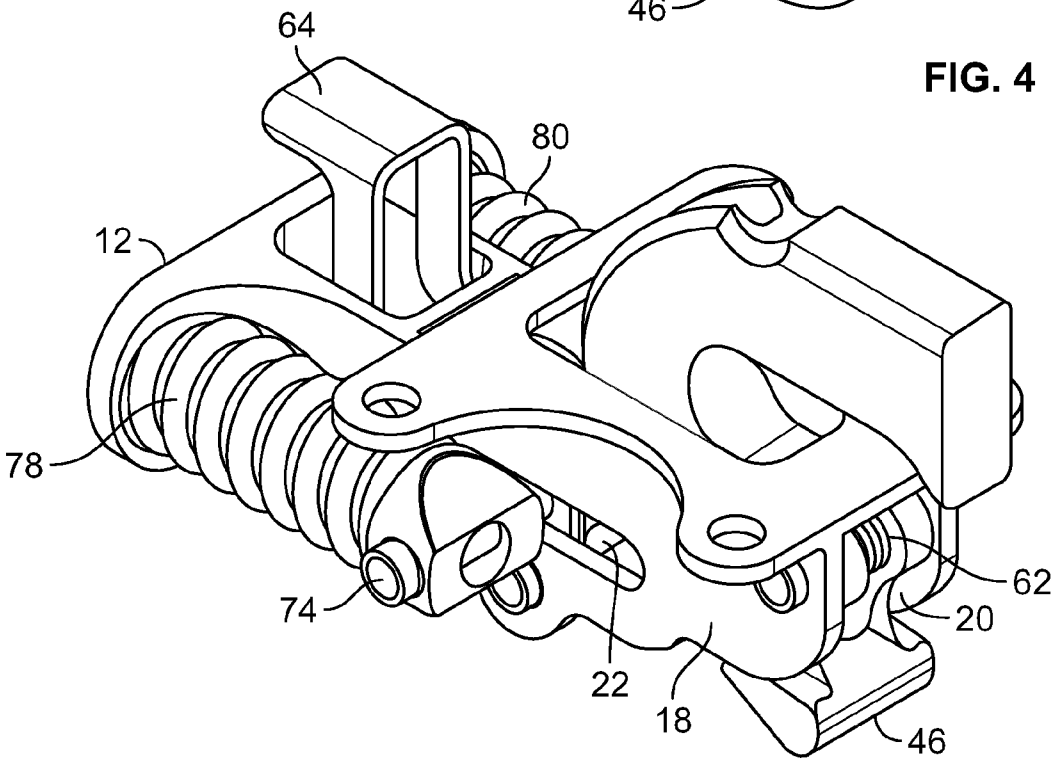

FIG. 5

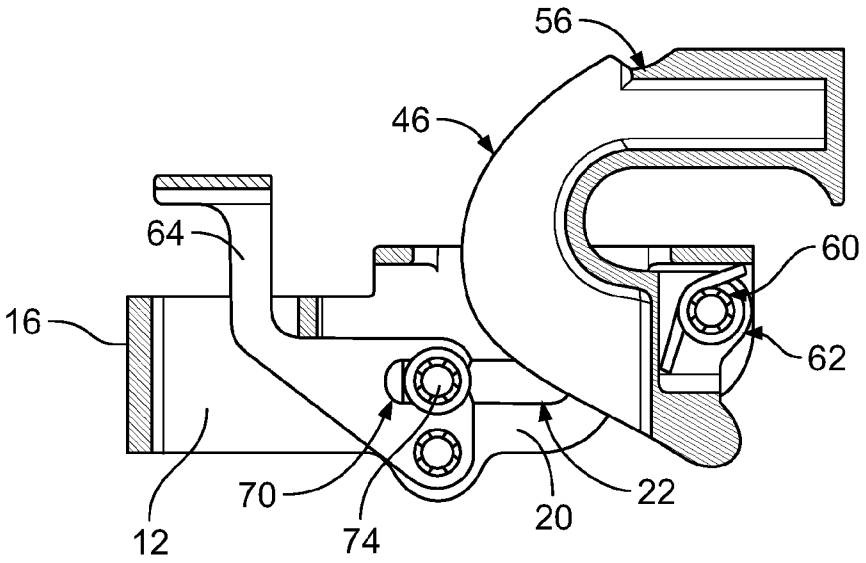

FIG. 6

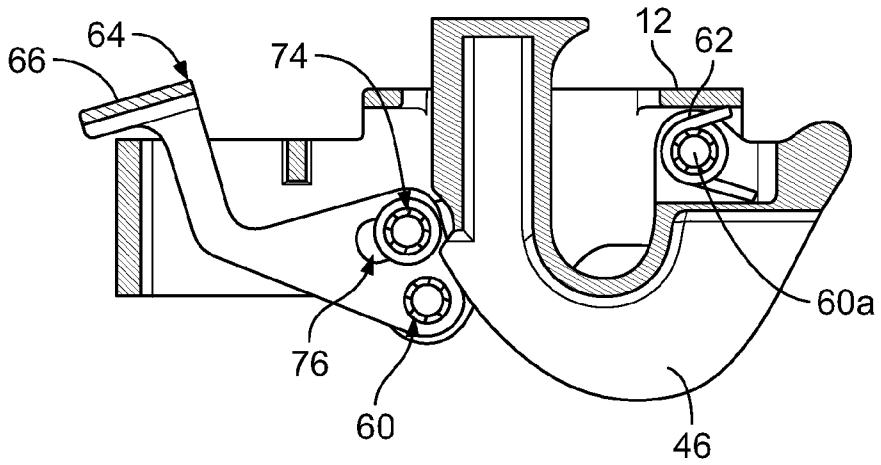

FIG. 7

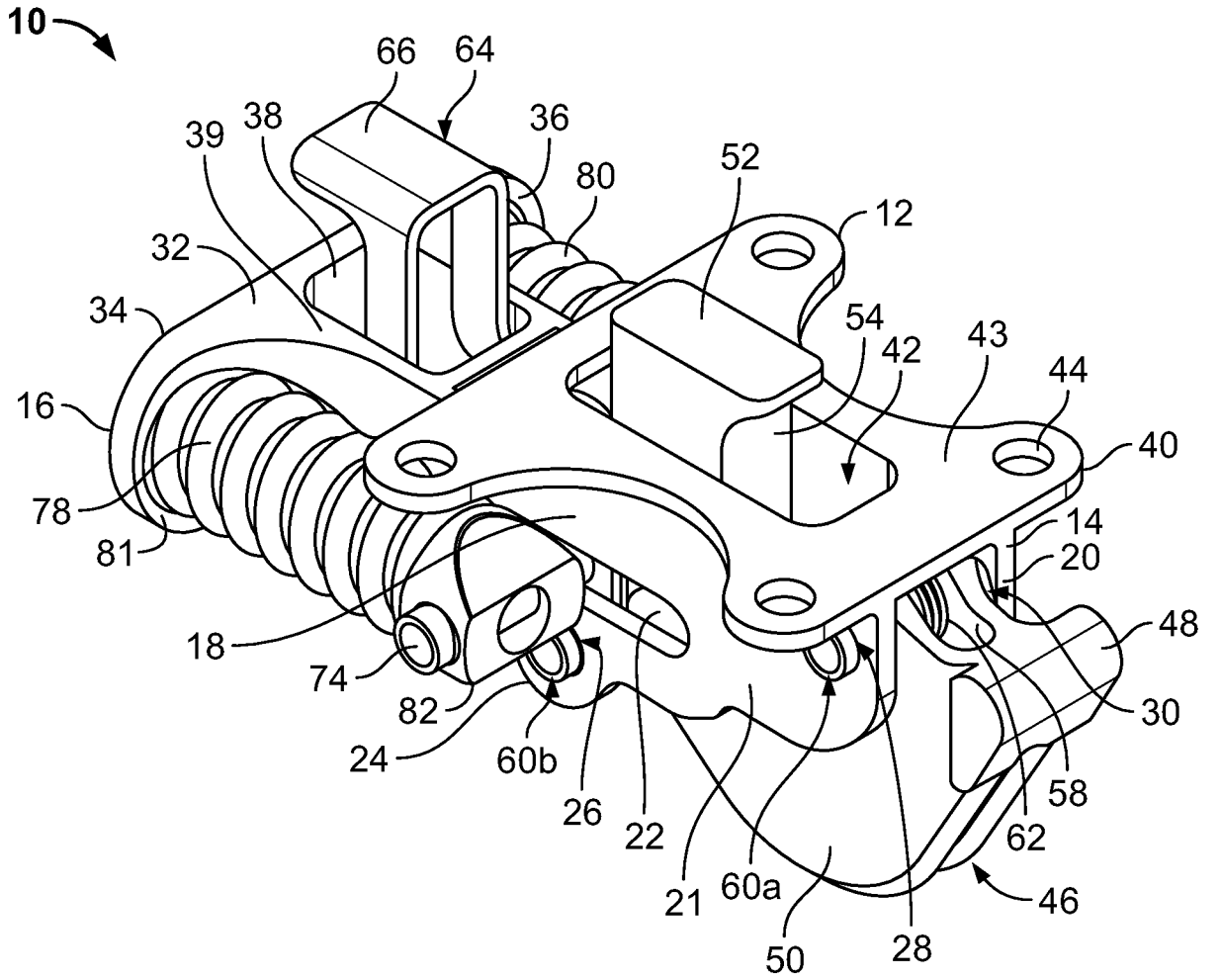
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FIG. 1