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Streeter

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(54) **ADJUSTABLE MOUNTING BRACKET AND METHOD FOR SECURING A PART IN PLACE**

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(51) **Int. Cl.**
B60K 11/04 (2006.01)

(52) **U.S. Cl.** **180/68.4**; 180/68.6; 165/67; 248/228.3; 248/231.41; 248/295.11; 248/297.21

(58) **Field of Classification Search** 180/68.4, 180/68.6; 248/228.3, 231.41, 295.11, 297.21; 165/67

See application file for complete search history.

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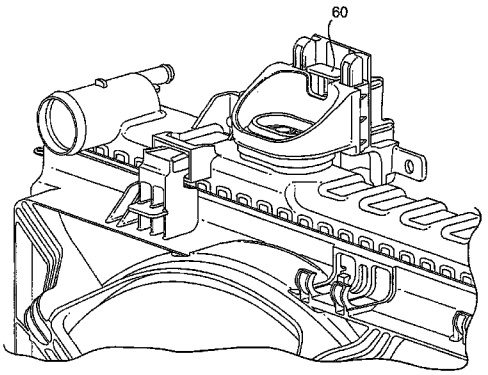
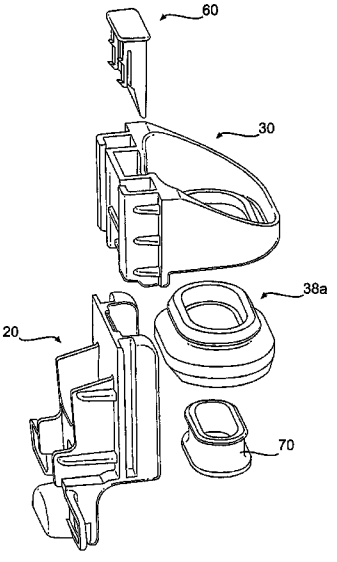
(57) **ABSTRACT**

The invention relates to a mounting bracket (**10**), in particular for mounting a radiator (**100**). The bracket (**10**) comprises a stationary member (**20**) to be attached to the vehicle and a movable member (**30**) slideably mounted on the stationary member (**20**), preferably using guide rails (**24***a*, **24***b*). The movable member (**30**) is configured to move from a first position to a second position to thereby secure the radiator (**100**). A ratchet mechanism (**42**) including teeth (**42***a*) on the stationary member (**10**) may be provided to lock the movable member (**30**). An independent claim is included directed to a method for securing a vehicle component.

2 Claims, 15 Drawing Sheets





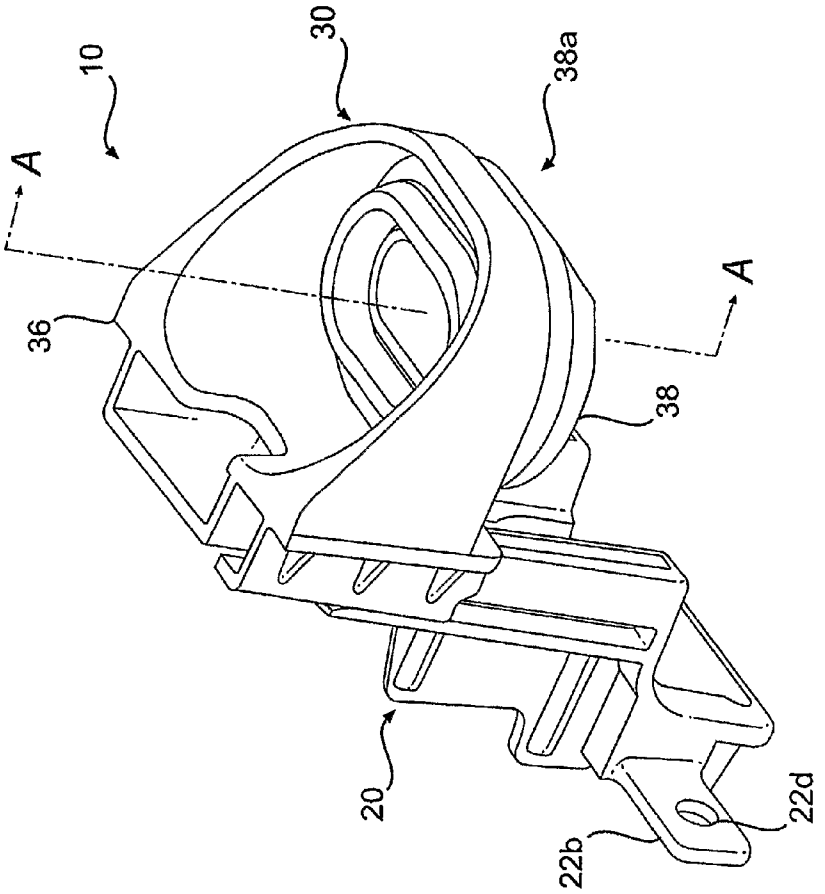


FIG. 1a

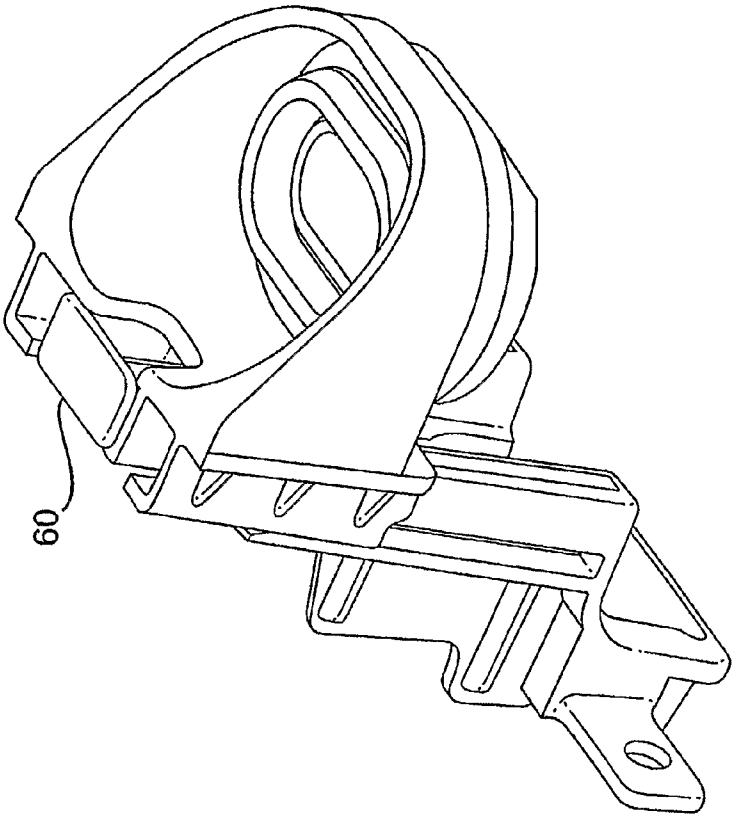


FIG. 1b

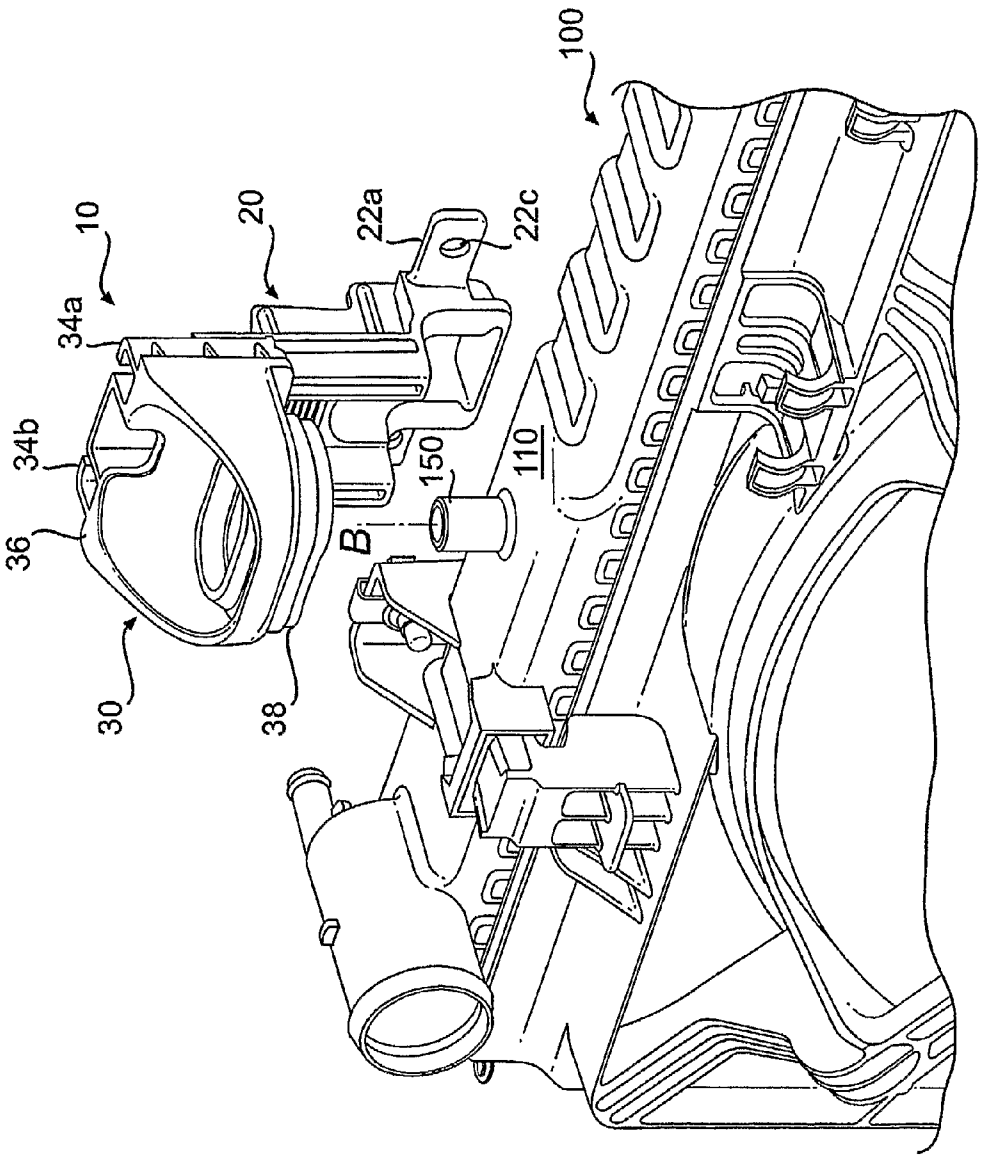


FIG. 2a

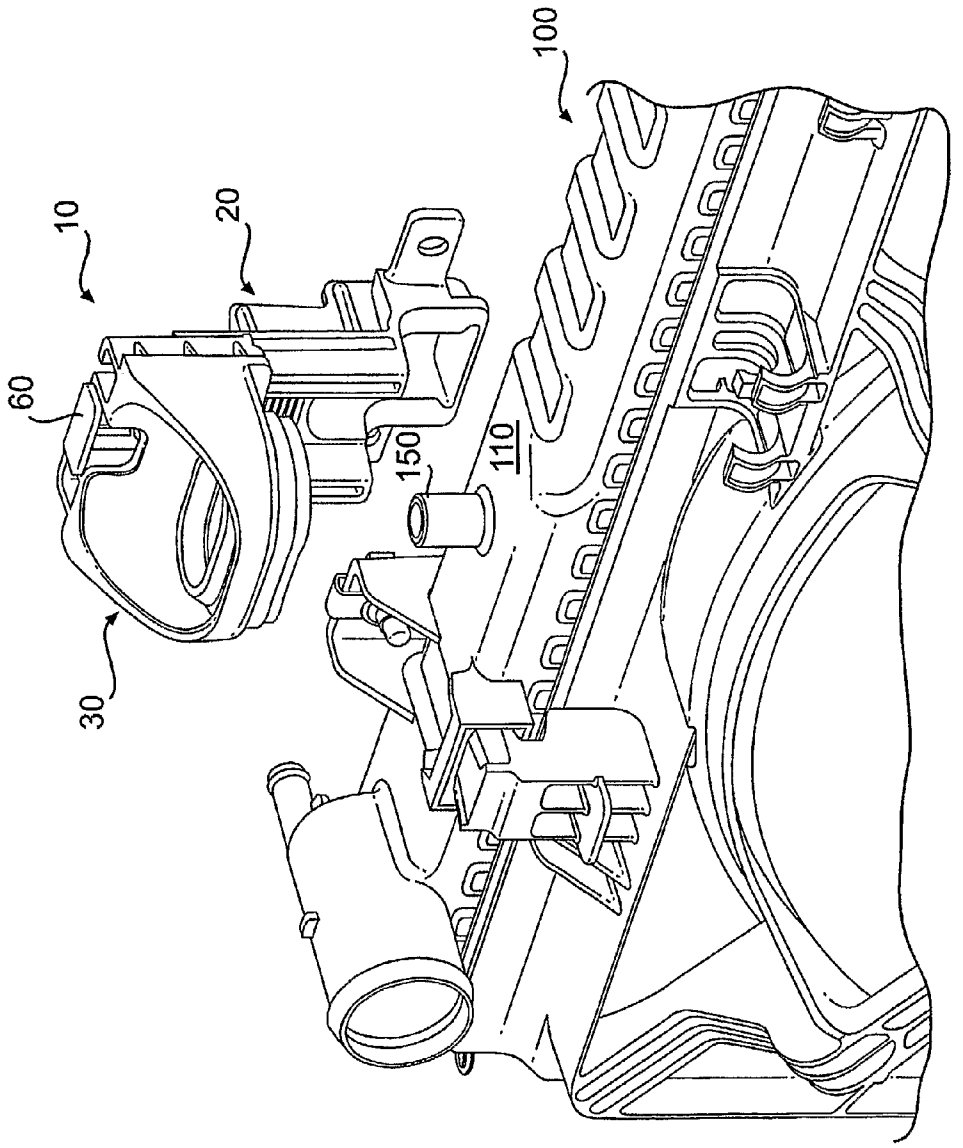


FIG. 2b

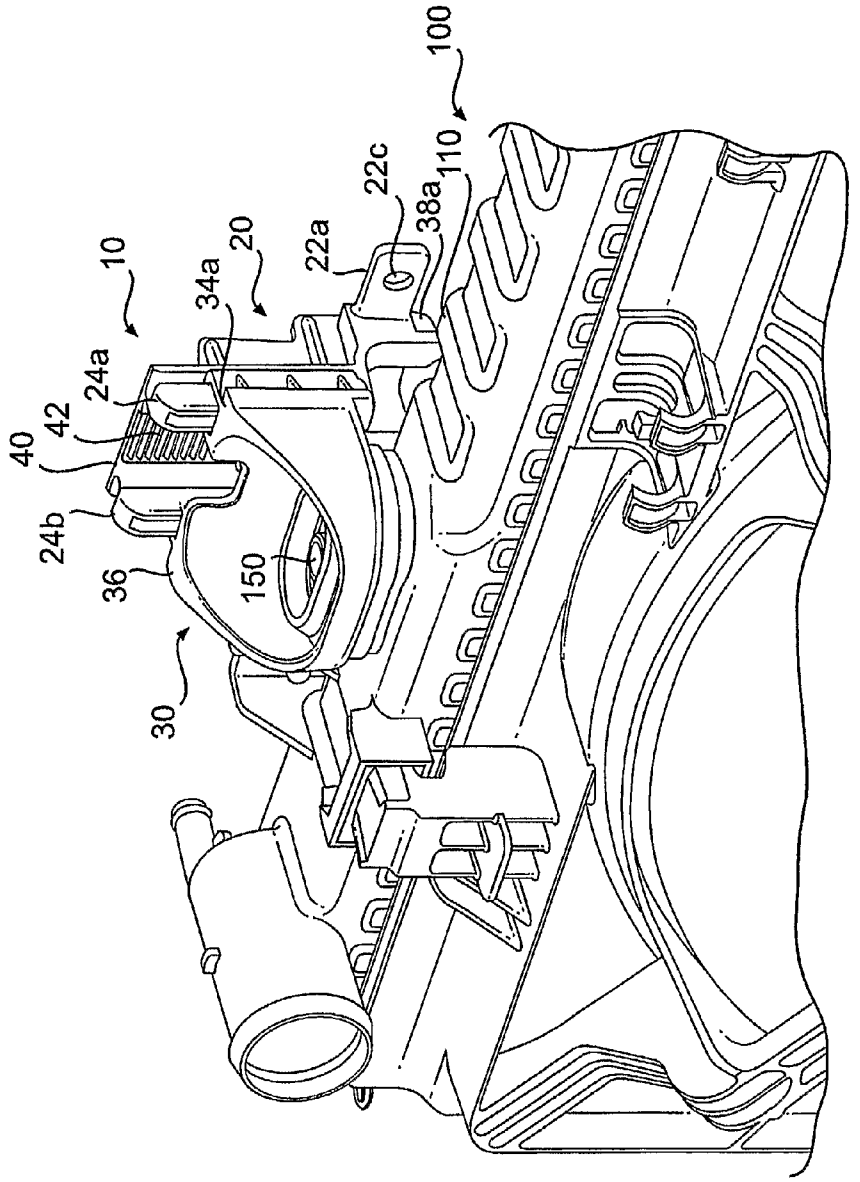


FIG. 3a

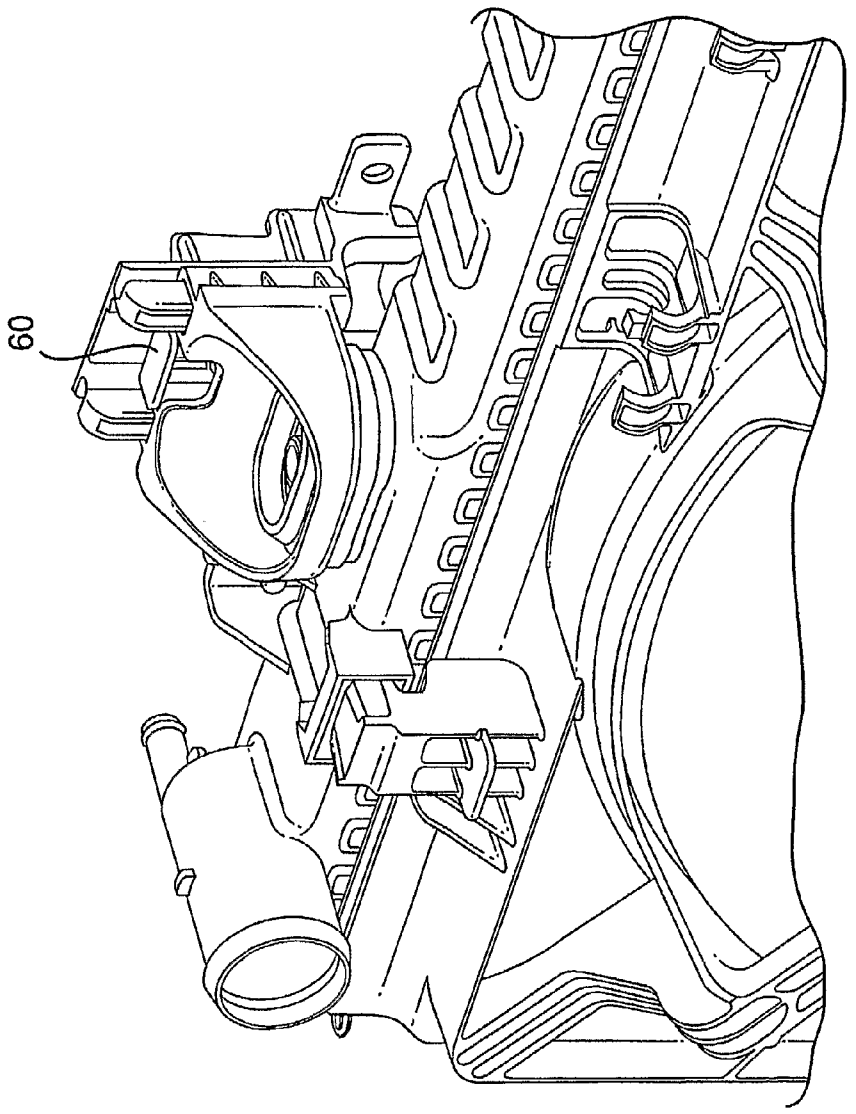


FIG. 3b

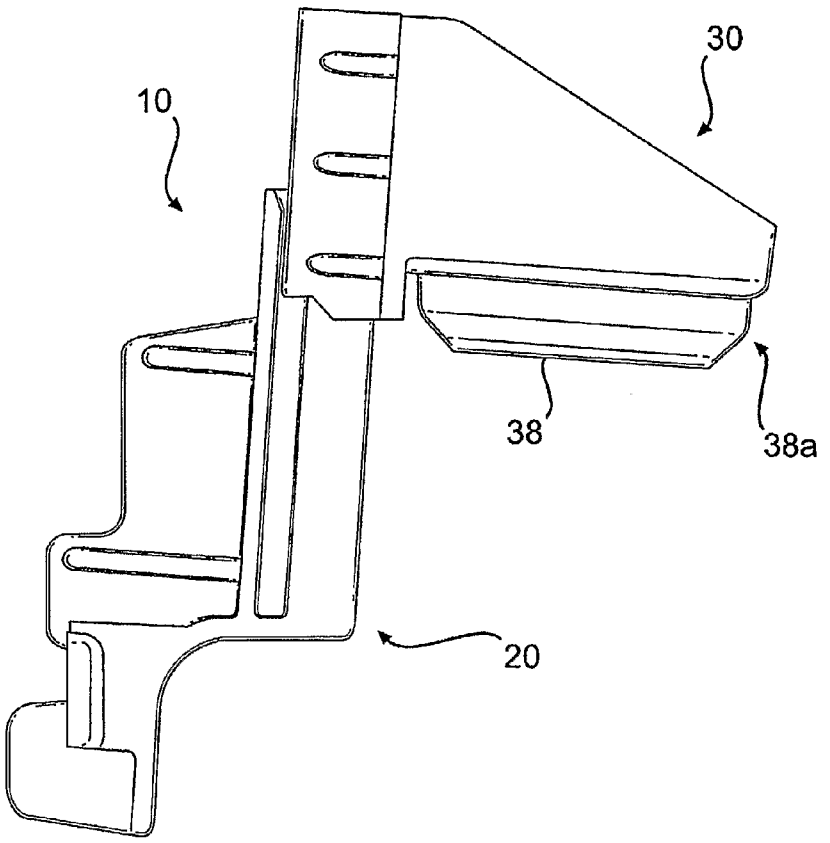


FIG. 4

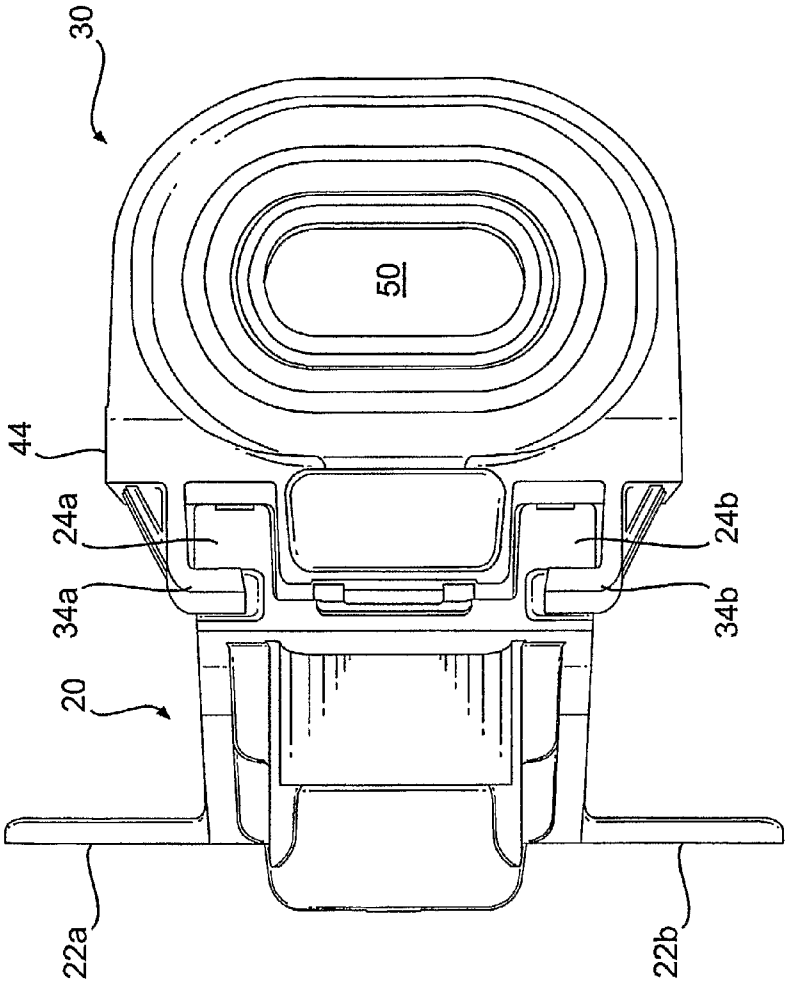


FIG. 5a

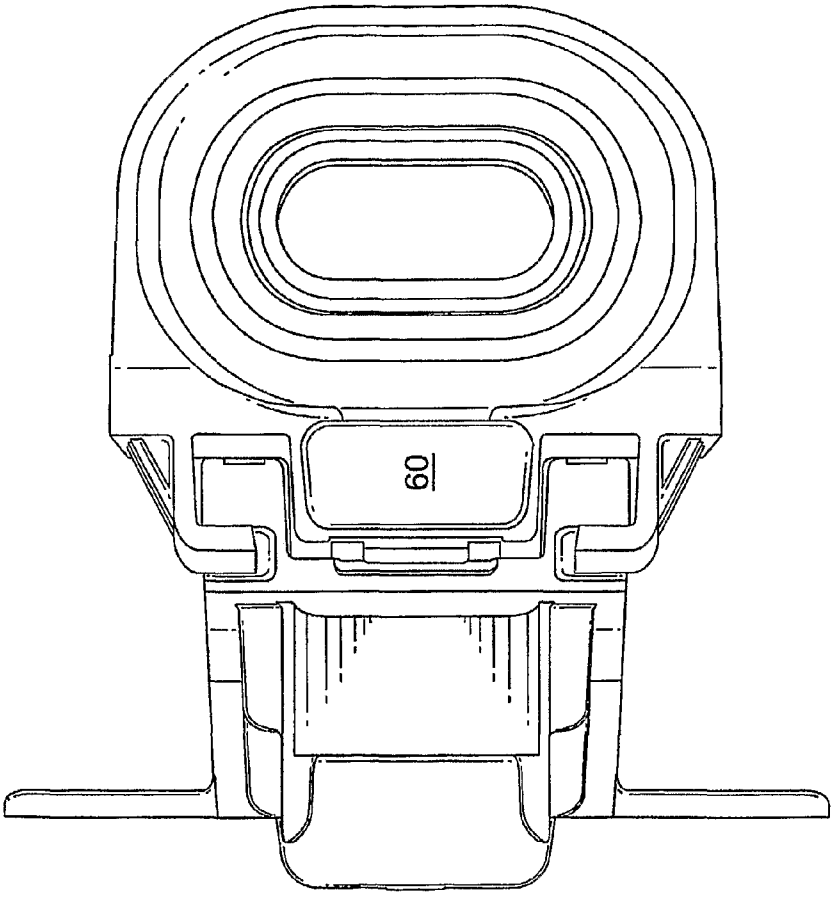


FIG. 5b

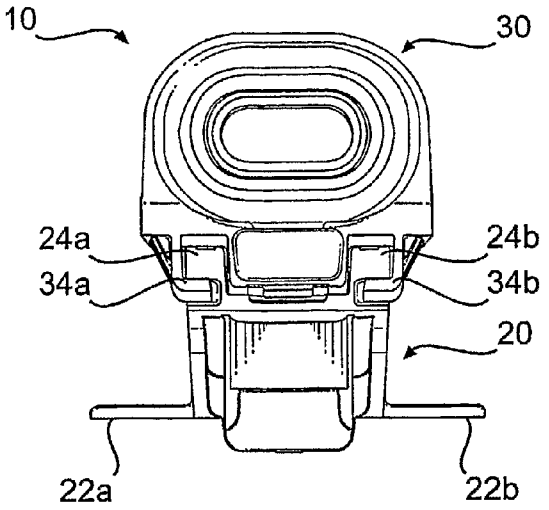


FIG. 6a

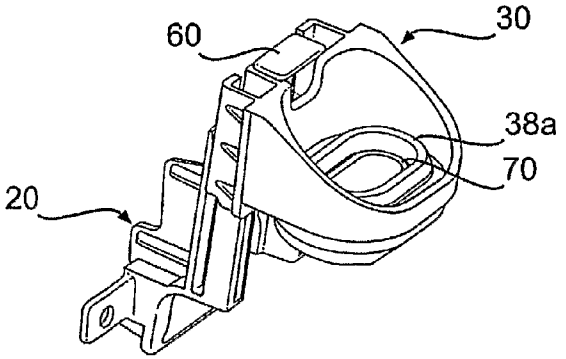


FIG. 6b

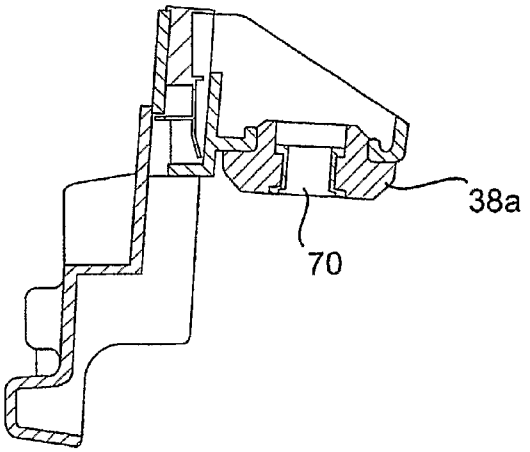


FIG. 6c

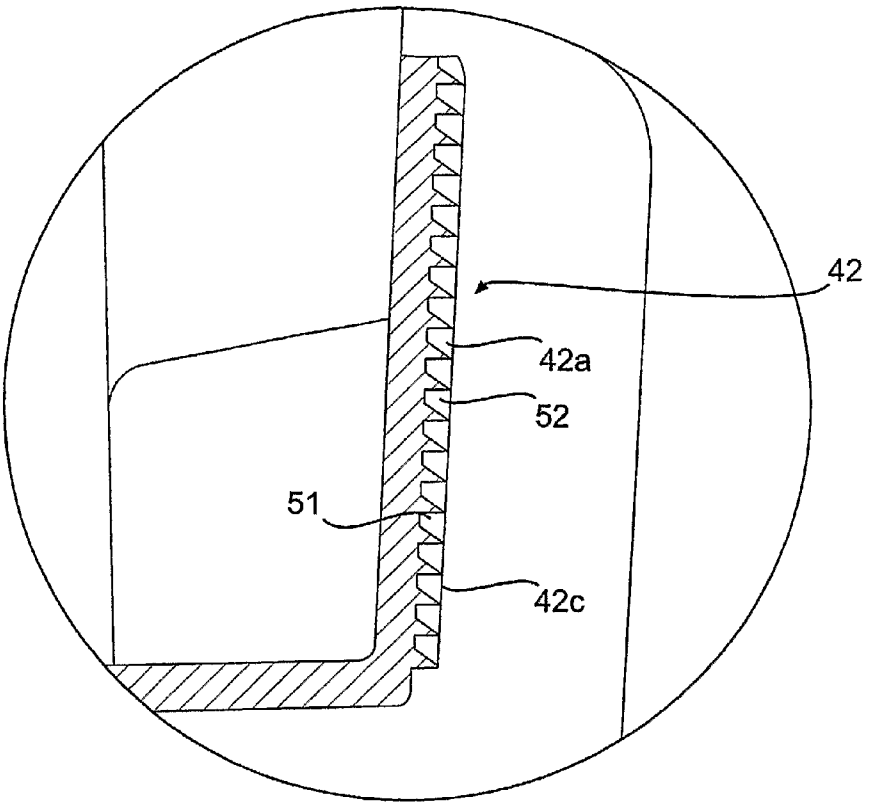


FIG. 7a

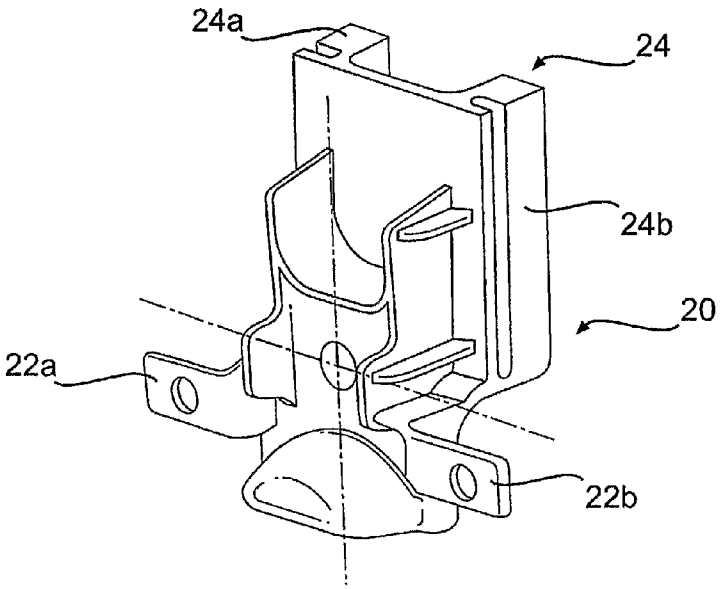


FIG. 7b

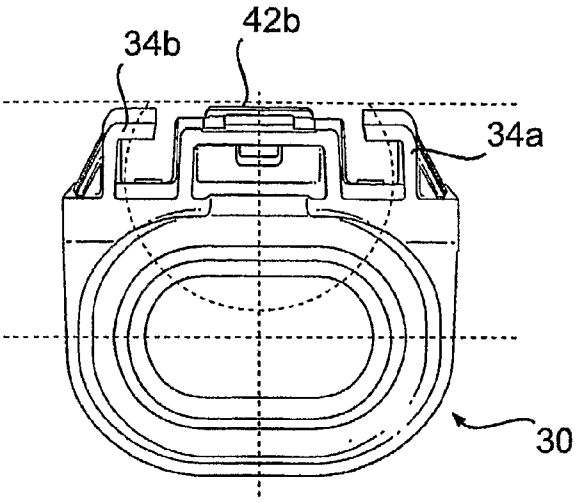


FIG. 8a

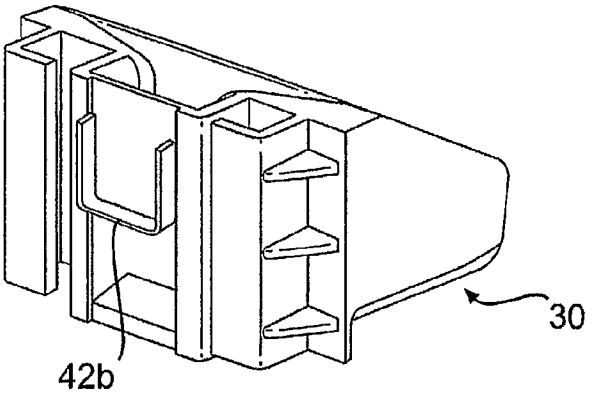


FIG. 8b

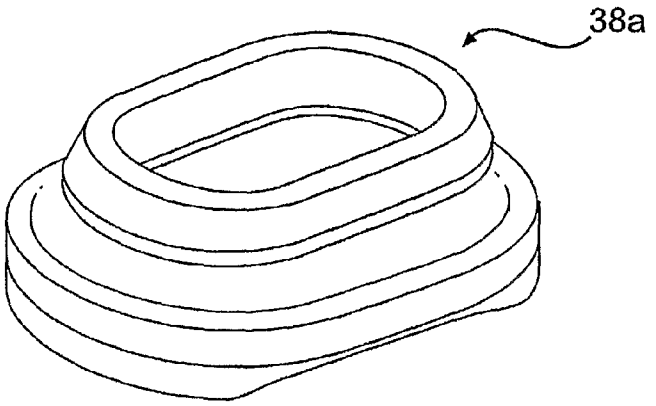


FIG. 9a

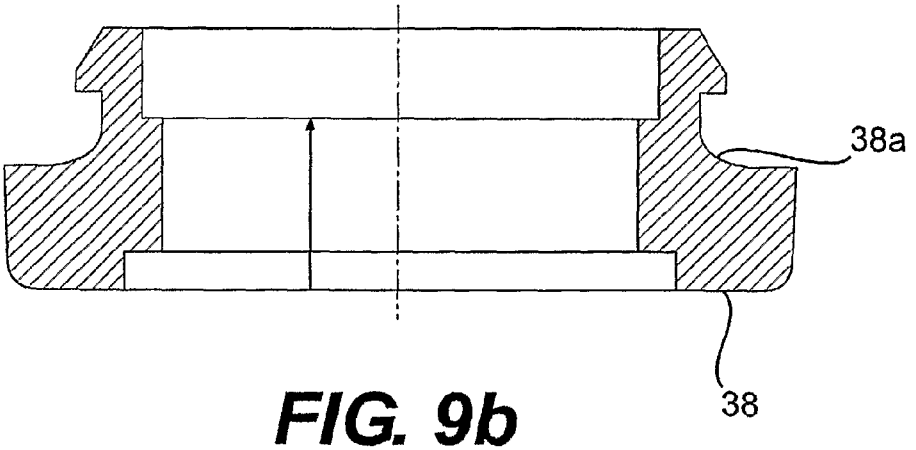


FIG. 9b

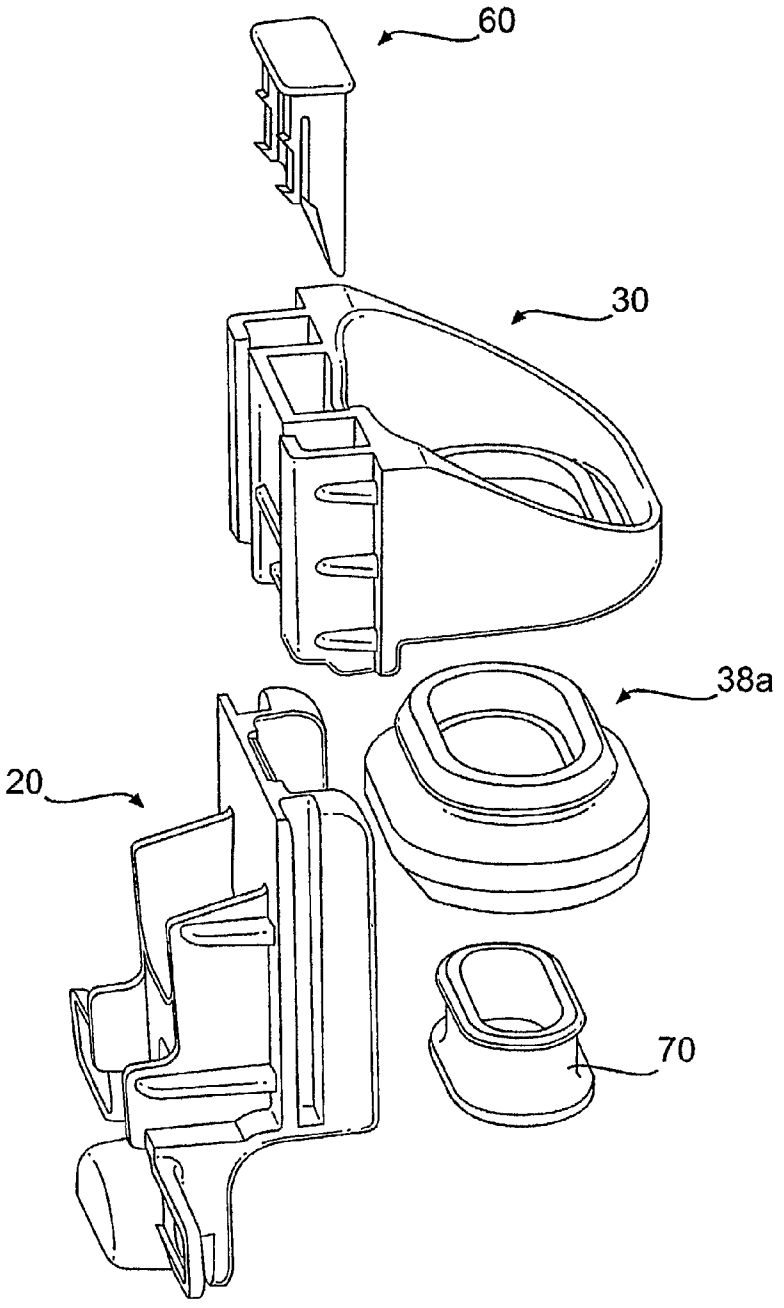


FIG. 10

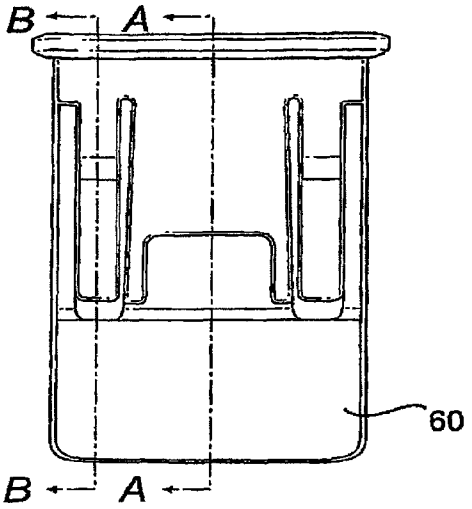


FIG. 11

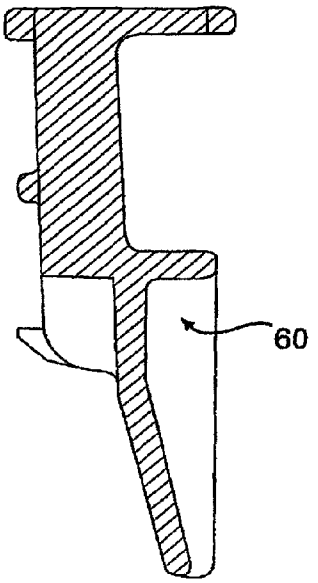


FIG. 11a

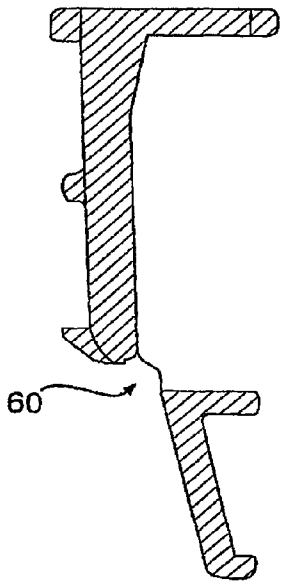


FIG. 11b

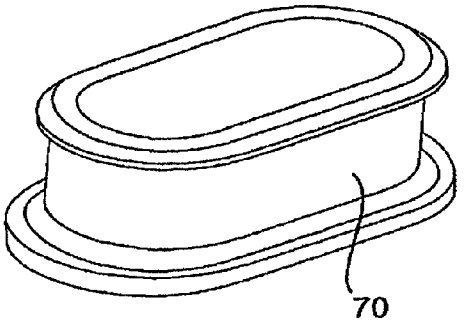


FIG. 12

ADJUSTABLE MOUNTING BRACKET AND METHOD FOR SECURING A PART IN PLACE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a mounting bracket and, more particularly, to an adjustable bracket for mounting an automotive component.

2. Description of Related Art

Traditionally, brackets have been used to attach automotive components to vehicles and to substantially restrain movement of such components. For example, an automotive component such as a radiator can be fixed in place with a bracket. To install the bracket, one portion of the bracket is attached to the vehicle and another portion of the bracket is attached to the automotive component. Attachment of the bracket to the vehicle is typically accomplished using standard fasteners (e.g., bolts, screws, rivets). Similarly, the bracket can be attached to the automotive component using a standard fastener such as a bolt and/or a special tool.

One disadvantage of a conventional bracket is that such a bracket typically has a preformed shape and is designed to be installed at a predetermined location in the vehicle. Accordingly, a conventional bracket can only be used to secure an automotive component having dimensions that correspond to the shape and predetermined placement of the bracket. As a result, the conventional bracket is unable to accommodate components of varying size or components that deviate from specified dimensional tolerances. Moreover, conventional brackets are attached to automotive components using standard fasteners and/or special tools, which increases the manufacturing cost and assembly time because extra parts must be purchased and utilized on the assembly line.

SUMMARY OF THE INVENTION

One aspect of the present invention relates to a bracket for securing a vehicle component. The bracket includes a stationary member configured to be attached to a vehicle and a movable member slideably mounted on the stationary member. The movable member is configured to move from a first position to a second position to thereby secure the vehicle component.

Another aspect of the present invention relates to a bracket. The bracket includes a support member for attachment to a vehicle body and a clamping member mounted on the support member. The clamping member is slideably adjustable so that the clamping member can be adjusted to secure vehicle components of various sizes.

Another aspect of the present invention relates to a method for securing a vehicle component in place. The method includes providing a bracket that includes a stationary member and a moveable member slideably mounted on the stationary member; attaching the stationary member to a vehicle body in the vicinity of a vehicle component; moving the moveable member toward the vehicle component; discontinuing moving the moveable member when it contacts the vehicle component; and either automatically during the movement or subsequent to the movement, engaging a latching mechanism to substantially restrain movement of the vehicle component.

Another aspect of the present invention relates to a vehicle. The vehicle includes a module containing at least a radiator and a bracket including a stationary member configured to be attached to a vehicle and a movable member slideably mounted on the stationary member. The movable member is configured to move from a first position to a second position to thereby secure the module in place.

Yet another aspect of the present invention relates to a method for installing an automotive component in a vehicle. The method includes providing a module containing at least a radiator; installing the module in the vehicle; providing a bracket that includes a stationary member and a moveable member slideably mounted on the stationary member; attaching the stationary member to the vehicle so that the moveable member is positioned above a top surface of the module; moving the moveable member toward the top surface of the module until the moveable member contacts the top surface of the module; and activating a latching mechanism, either during the movement or subsequent to the movement, to retain the moveable member in contact with the top surface of the module.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate preferred embodiments of the invention and together with the description, serve to explain principles of the invention.

FIG. **1***a* is a perspective view of a first embodiment of a bracket according to the present invention.

FIG. **1***b* is a perspective view of a second embodiment of a bracket according to the present invention.

FIG. **2***a* is a perspective view of the bracket of FIG. **1***a* in an uninstalled position.

FIG. **2***b* is a perspective view of the bracket of FIG. **1***b* in an uninstalled position.

FIG. **3***a* is a perspective view of the bracket of FIG. **1***a* in an installed position.

FIG. **3***b* is a perspective view of the bracket of FIG. **1***b* in an installed position.

FIG. **4** is a side elevation view of the bracket of FIG. **1***b*.

FIG. **5***a* is a top plan view of the bracket of FIG. **1***a*.

FIG. **5***b* is a top plan view of the bracket of FIG. **1***b*.

FIGS. **6***a* to **6***c* are detailed drawings showing details of the brackets of FIGS. **1***a* and **1***b*.

FIGS. **7***a* and **7***b* are drawings showing details of the stationary member of the bracket of FIGS. **1***a* and **1***b*.

FIG. **8***a* is a top view and FIG. **8***b* is a perspective view showing details of the movable portion of the bracket of FIG. **1***a* and FIG. **1***b*.

FIG. **9***a* is a perspective view and FIG. **9***b* is a cross-sectional view showing an isolator member of the bracket of FIG. **1***a* and FIG. **1***b*.

FIG. **10** is an exploded view of the bracket shown in FIG. **1***b*.

FIG. **11** is a front view of a preferred, optional locking member, and FIGS. **11***a* and **11***b* are cross-sectional views taken along the lines A-A and B-B, respectively.

FIG. **12** is a perspective view of an optional insert member.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Reference will now be made in detail to presently preferred embodiments of the invention, an example of each being illustrated in the accompanying drawings. An effort has been made to use the same reference numbers throughout the drawings to refer to the same or like parts.

FIGS. **1***a*, **2***a*, **3***a* and **5***a* show a first embodiment of a bracket **10** according to the present invention. FIGS. **1***b* through **5***b* show a second embodiment according to the invention. The bracket **10** is configured to secure an automo-

tive (or vehicle) component **100** in position when the automotive component **100** is installed in a vehicle. As shown in FIGS. **1-3**, the bracket **10** includes a stationary member **20**, a moveable member **30**, and a latch mechanism **40**. The second embodiment, shown in FIG. **1***b*, differs from the first embodiment mainly by virtue of employing a separate locking member **60** to selectively engage the latch mechanism.

The stationary (or support) member **20** supports the moveable member **30** and is configured to be attached to a vehicle structure such as a vehicle frame or body. As shown in FIGS. **1** and **2**, the stationary member **20** includes fastening members **22***a* and **22***b* for attaching the stationary member **20** to the vehicle structure. The fastening members **22***a* and **22***b* preferably include holes **22***c* and **22***d*, respectively, so that the fastening members **22***a* and **22***b* can be connected to the vehicle structure using standard fasteners such as bolts, screws, or rivets. Alternatively, the fastening members **22***a* and **22***b* can be attached to the structure by welding or bonding.

As shown in FIGS. **7** and **8**, the stationary member **20** includes a mounting interface **24** that is configured to engage a corresponding mounting interface **34** on the moveable member **30** so that the moveable member **30** is supported on the stationary member **20**. For example, the mounting interface **24** of the stationary member **20** may include a first guide rail **24***a* and a second guide rail **24***b* (shown in FIG. **7**). Similarly, the mounting interface **34** of the moveable member **30** may include a first jaw **34***a* and a second jaw **34***b* (shown in FIG. **8**). As shown in FIGS. **5** and **6**, the moveable member **30** is mounted on the stationary member **20** by inserting the guide rails **24***a*, **24***b* into the jaws **34***a*, **34***b*, respectively. In this manner, the stationary member **20** supports the moveable member **30**.

The moveable (or clamping) member **30** is mounted on the stationary member **20** so that a position of the moveable member **30** is adjustable relative to the stationary member **20**. For example, the moveable member may be adjustable between a first position (shown in FIG. **2**) in which the moveable member **30** is not contacting the automotive component **100** (i.e., an uninstalled position) and a second position (shown in FIG. **3**) in which a contact surface **38** of the moveable member **30** is contacting a top surface **110** of the automotive component **100** (i.e., an installed position). Preferably, the moveable member **30** is slideably mounted on the stationary member **20** so that the moveable member **30** can move from the first position toward the second position. For example, the jaws **34***a*, **34***b* may be slideable along a length of the guide rails **24***a*, **24***b*. As a result, a height of the moveable member **30** is adjustable so that the bracket **10** can secure automotive components of various sizes and dimensional tolerances.

The moveable member **30** is adapted to be actuated from the uninstalled position to the installed position in a simple manner that does not require the use of special tools. For example, the moveable member **30** may be moved from the uninstalled position to the installed position by applying a force to an upper surface **36** of the moveable member **30** so that the moveable member **30** moves toward the automotive component **100**. The force may be applied, for example, by a hand of a person or by a robot or a machine. The degree of force required to actuate the moveable member **30** will vary depending on the design of the bracket **10** and can be readily determined by one of skill in the art. In the case of the first embodiment of FIG. **1***a*, the force is typically greater than in the case of the second embodiment of FIG. **1***b*, as explained below.

The bracket **10** includes a latch mechanism **40** that may enable either one-way actuation of the moveable member **30** or two-way actuation of the moveable member **30**. Specifically, the latch mechanism **40** in the first embodiment is configured to allow only one-way movement of the moveable member **30** in a direction toward the automotive component **100** (i.e., in a direction toward the second or installed position) and to prevent movement of the moveable member **30** in a direction away from the automotive component **100** (i.e., in a direction toward the first or uninstalled position). In this case, the latch mechanism **40** is activated automatically as the moveable member **30** moves along the stationary member **20** toward the installed position. For example, the latch mechanism **40** may include an ratchet mechanism **42** that is designed to be automatically engaging. The ratchet mechanism **42** has teeth **42***a* (shown in FIG. **7**) disposed on the stationary member **20** and a projection **42***b* (shown in FIG. **8**) disposed on the moveable member **30**. Each tooth **42***a* includes an inclined surface **S1** and a substantially straight surface **S2**. As shown in FIG. **8**, the inclined surfaces **S1** slope toward the installed position so that the projection **42***b* slides over an inclined surface **S1** when sufficient force is applied to the upper surface **36** of the moveable member **30**. After traversing an inclined surface of a tooth **42***a* or when application of the force is halted, the projection **42***b* snaps into a space **42***c* between adjacent teeth **42***a* and is prevented from moving back toward the uninstalled position by a surface **S2**. In this manner, the latch mechanism **40** allows the moveable member **30** to proceed in only one direction and can retain the moveable member **30** in a particular position. Thus, in one preferred embodiment, the bracket **10** includes an automatic latch mechanism **40** that operates automatically for one-way actuation of the moveable member **30** without the use of additional parts such as fasteners or special tools.

In the alternative second embodiment, the bracket **10** includes a selectively engageable latch mechanism adapted to be manually locked or activated (e.g., by a person or robot) to secure the moveable member **30** in a desired position. In the second embodiment shown in FIG. **1***b*, a separate locking member **60** is provided to selectively engage the latch mechanism **40** in its final latched condition when the moveable member **30** has reached its final position. In this embodiment, the projection **42***b* is oriented such that is either does not contact or engage with the ratchet teeth **42***a*, or so that it only lightly contacts teeth **42***a*. In this way, the moveable member can be moved more easily and optionally can be moved in both directions during mounting of a part or component. Only when the moveable member **30** is positioned in its final location is the locking member **60** inserted and/or fully inserted into the moveable member, in order to bias the projection **42***b* into (more) secure engagement with the teeth **42***a*. Details of one preferred locking member **60** are shown in FIGS. **11**, **11***a* and **11***b*.

Of course, many other types of selectively engageable locking systems are conceivable. For example, other systems for selectively engaging the ratchet mechanism are conceivable. In another example, the selectively engageable locking mechanism could include at least one aperture disposed on the moveable member **30** and a plurality of corresponding apertures disposed on the stationary member **20**. The moveable member **30** could be moved along the stationary member **20** until the aperture on the moveable member **30** aligns with an aperture on the stationary member **20** that is at the desired position. The manual latch mechanism could be activated by inserting a pin through the aligned apertures so that the moveable member **30** is retained relative to the stationary member **20**. When a selectively engageable latch mechanism is

employed, the moveable member **30** can be configured for one-way (i.e., one direction) or two-way (i.e., two direction) actuation.

The latch mechanism **40** may also include a release member for releasing or disengaging the latch mechanism **40**. When the latch mechanism **40** is actuated, the moveable member **30** is released and can be freely moved along the stationary member **20** in either direction (i.e., in a direction toward the installed position and in a direction toward the uninstalled position). As shown in FIG. **5***a*, an optional release member **44** may be, for example, a lever configured to allow the projection **42***b* to disengage from a space **42***c*. In this manner, the bracket **10** can be readjusted after initial installment, e.g., to replace the mounted component. Alternatively, the bracket **10** may be configured for a single use so that readjustment of the bracket **10** is accomplished by breaking the bracket **10** to disengage the latch mechanism **40** and replacing the bracket **10** with a new bracket. In the case of the second embodiment, the locking member **60** can be removed in order to reposition the moveable member **30**.

The stationary member **20** and the moveable member **30** may be formed of any material suitable for use in a vehicle application. For example, the stationary member **20** and the moveable member **30** may be formed of a polymer, a composite, or a metal. Preferably, however, the stationary member **20** and the moveable member **30** are formed of a nylon plastic.

As shown, e.g., in FIGS. **1** and **4**, the moveable member **30** preferably includes an isolator member **38***a* having a clamping surface **38**. When the moveable member **30** is retained in the installed position by the latch mechanism **40**, the clamping surface **38** preferably contacts a top surface **110** of the automotive component **100** with sufficient force to securely stabilize (or fix) the component **100** in position so that movement of the component **100** is substantially restrained. The degree of force required to stabilize the component **100** depends on the automotive application and can readily be determined by one of skill in the art. Preferably, the clamping surface **38** and the isolator member **38***a* are formed of a polymer or rubber material. The material can also be selected so as to reduce the transmission of vibration through the isolator member **38***a*, i.e., by having a degree of resilience.

The moveable member **30** of the bracket **10** may include an aperture **50** that permits access to a portion of the automotive component **100** when the bracket **10** is in the installed position. For example, the top surface **110** of the automotive component **100** may include a connection **150** (e.g., for attaching a hose such as a coolant hose). To permit access to the connection **150** when the bracket **10** is in the installed position, the stationary member **20** is connected to the vehicle structure so that an axis A-A of the aperture **50** of the moveable member **30** substantially aligns with an axis B-B of the connection **150**. Accordingly, when the moveable member **30** is moved into the installed position, the connection **150** is received in the aperture **50** (shown in FIG. **3**) to enable access to the connection **150**.

In certain applications for the moveable member having an aperture **50**, it may also be desirable to include an optional insert that lines the aperture **50**. Such an insert is shown in exploded FIG. **10** and also in FIG. **12**. This insert is typically made of a more wear resistant material, such as a hard plastic, metal or composite material, since one reason to include such an insert is to prevent wear of the isolator member **38***a*.

In operation, the bracket **10** may be utilized to secure and stabilize the automotive component **100** in a vehicle. For example, the automotive component **100** (e.g., a module containing at least a radiator) is installed in a vehicle. The stationary member **20** of the bracket **10** is attached to the vehicle so that the moveable member **30** is positioned above the top surface **110** of the automotive component **100**. A force is applied to the upper surface **36** of the moveable member **30** so that the moveable member **30** moves relative to the stationary member **20** toward the top surface **110** of the automotive component **100**. Application of the force is continued at least until the contact surface **38** of the moveable member **30** contacts the top surface **110** of the automotive component **100**. Preferably, application of the force is continued until the contact surface **38** is pressed against the top surface **110** of the component **100** with sufficient force to substantially restrain movement and/or stabilize the component **100**. The latch mechanism **40** is activated (automatically or selectively) to thereby retain the moveable member **30** in contact with the top surface **110** of the automotive component **100**.

In both the first and second embodiments, the two relatively moveable parts of the bracket can be initially connected to one another, e.g., by having the ratchet mechanism engaged in the first (or one of the initial few) tooth. This minimizes the number of separate parts to be handled during assembly or when supplying the assembly line. In the second embodiment, this initial connection can be either as a result of a partial or a complete insertion of the locking member **60**, and or by providing differently configured teeth near the beginning of the row of teeth. Obviously, the locking member can optionally be removed, if desired, during adjustment of the bracket, but this is not necessary.

Thus, according to embodiments of the present invention, an adjustable bracket for securing automotive components of varying size and/or dimensional tolerance is provided. The adjustable bracket improves vehicle manufacturability and reduces cost by decreasing the number of parts and the assembly time required to install and secure an automotive component. Although the automotive component **100** shown in FIGS. **2** and **3** is a module that includes a radiator, a condenser, and a fan (i.e., a condenser radiator fan module or CRFM), the present invention is not limited to such modules. Rather, the invention applies to any automotive component that needs to be stabilized and/or securely fixed in place in a vehicle. Such automotive components include, for example, radiators, condensers, batteries, filter housings, coolant overflow reservoirs, fuel tanks, and electronic control modules.

Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only.

What is claimed is:

1. A bracket for securing a radiator, comprising:

a stationary member attached to a vehicle at a location adjacent to a radiator, the stationary member including first and second spaced rails; and

a movable member movable relative to the stationary member while the stationary member is attached to the

vehicle, the movable member comprising a body portion and first and second spaced channels,

wherein the movable member is mounted on the stationary member for movement in a sliding direction with the first rail slidably retained in the first channel and the second rail slidably retained in the second channel from a first position spaced from the radiator to a second position pressing against the radiator, and

wherein first and second rails are separated by a gap and wherein the movable member includes a projecting portion extending into the gap.

2. The bracket of claim **1** including a locking member extending, in the sliding direction, into an opening in the projecting portion.

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