

US Patent & Trademark Office

Patent Public Search | Text View

United States Patent Application Publication

20250263036

Kind Code

A1

Publication Date

August 21, 2025

Inventor(s)

Deore; Prashant K. et al.

BULL-BAR ASSEMBLY WITH ACCESS TO A VEHICLE COMPONENT

Abstract

Systems and other embodiments described herein relate bull-bar assemblies with an easy access latch. In one embodiment, a bull-bar assembly for a vehicle includes a panel defining a component aperture through which a vehicle component is accessible. The panel further defines a latch aperture. The bull-bar assembly also includes a cover attached to the panel and movable between a closed position, in which the cover blocks the component aperture, and an open position, in which the cover unblocks the component aperture. The bull-bar assembly further includes a latch accessible through the latch aperture and movable between an actuated position, in which the latch disengages the cover to unblock the component aperture, and an unactuated position, in which the latch engages the cover to block the component aperture.

Inventors: Deore; Prashant K. (Canton, MI), Sheehy; Christopher P. (Ypsilanti, MI), Arellano; Nora (Ann Arbor, MI)

Applicant: Toyota Motor Engineering & Manufacturing North America, Inc. (Plano, TX)

Family ID: 1000007694171

Assignee: Toyota Motor Engineering & Manufacturing North America, Inc. (Plano, TX); Toyota Jidosha Kabushiki Kaisha (Toyota-shi Aichi-ken, JP)

Appl. No.: 18/443457

Filed: February 16, 2024

Publication Classification

Int. Cl.: B60R19/52 (20060101)

U.S. Cl.:

CPC B60R19/52 (20130101); B60R2019/522 (20130101)

Background/Summary

TECHNICAL FIELD

[0001] The subject matter described herein relates, in general, to bull-bar assemblies and, more particularly, to bull-bar assemblies that provide access to one or more vehicle components.

BACKGROUND

[0002] In some vehicles, vehicle accessories and/or components may be installed to the vehicle or housed within the vehicle in locations that are difficult for a user to access, for example, behind covers, within compartments, etc. In such circumstances, a user may need to carry spare tools that are required to access these components. For example, a user may need to carry a screwdriver or another hand tool that may be used to access such components. Such instances may require the user to carry these tools on their person or store them in the vehicle for later use. In instances in which the user does not have the tool, the user may not be able to access the vehicle component.

SUMMARY

[0003] In one embodiment, example systems relate to a bull-bar assembly for a vehicle. As mentioned above, vehicle components may be stored on the vehicle in locations that are difficult for a user to access. As a result, accessing vehicle components may require a user to carry hand tools or may require the installation of expensive closures that facilitate accessing and housing of vehicle components.

[0004] The embodiments described herein provide a latch mechanism for a bull-bar assembly that provides a cost-effective and user-friendly means for a user to access a vehicle component housed in the bull-bar assembly. In one arrangement, the bull-bar assembly includes, among other components of the bull-bar assembly, a panel that houses a vehicle component, for example, a winch for vehicle recovery.

[0005] The panel, in one embodiment, defines a component aperture through which a user can access the vehicle component. The bull-bar assembly also includes, in one arrangement, a cover that blocks the component aperture to respectively prevent dirt and debris from passing through the component aperture and contacting the vehicle component and to provide a user access to the vehicle component.

[0006] The bull-bar assembly, in one arrangement, further includes a latch that facilitates movement of the cover between an open position, in which the cover unblocks the component aperture to provide user access to the vehicle component, and a closed position, in which the cover blocks the component aperture. In one embodiment, the panel defines a latch aperture that provides user access to the latch through the panel in a similar way as the component aperture.

[0007] To prevent dirt and debris from entering the latch aperture, in one arrangement, the bull-bar assembly includes a grommet that blocks the latch aperture when installed to the panel. The grommet, when removed from the panel, provides user access to the latch. In this way, the user can engage the latch through the latch aperture to disengage the latch from the cover, which allows the cover to move to the open position away from the panel to provide access to the vehicle component through the component aperture.

[0008] In one arrangement, the latch is supported by and connected to a cross-member of the bull-bar assembly that provides lateral rigidity to the bull-bar assembly. Accordingly, the arrangements

described herein have the benefit of providing a user-friendly, cost-effective bull-bar assembly that houses a vehicle component while also providing user access to the vehicle component using various apertures in the panel in conjunction with a latch.

[0009] In one embodiment, a bull-bar assembly for a vehicle includes a panel defining a component aperture through which a vehicle component is accessible. The panel further defines a latch aperture. The bull-bar assembly also includes a cover attached to the panel and movable between a closed position, in which the cover blocks the component aperture, and an open position, in which the cover unblocks the component aperture. The bull-bar assembly further includes a latch accessible through the latch aperture and movable between an actuated position, in which the latch disengages the cover to unblock the component aperture, and an unactuated position, in which the latch engages the cover to block the component aperture.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate various systems, methods, and other embodiments of the disclosure. It will be appreciated that the illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent one embodiment of the boundaries. In some embodiments, one element may be designed as multiple elements, or multiple elements may be designed as one element. In some embodiments, an element shown as an internal component of another element may be implemented as an external component and vice versa. Furthermore, elements may not be drawn to scale.

[0011] FIG. 1A illustrates one example of a bull-bar assembly for a vehicle.

[0012] FIG. 1B illustrates one example of a vehicle component located behind the bull-bar assembly.

[0013] FIG. 2A illustrates one example of a close-up front view of a latch that unlatches a cover of the bull-bar assembly to provide access to the vehicle component.

[0014] FIG. 2B illustrates one example of a close-up rear view of the latch and the cover.

[0015] FIG. 3A illustrates one example of a side cross-sectional view of the bull-bar assembly with the cover in a closed position.

[0016] FIG. 3B illustrates one example of a side cross-sectional view of the bull-bar assembly with the cover in an open position to provide access to the vehicle component.

DETAILED DESCRIPTION

[0017] Systems and other embodiments associated with a bull-bar assembly for a vehicle are disclosed. As mentioned above, vehicle components may be stored on the vehicle in locations that are difficult for a user to access. As a result, accessing vehicle components may require a user to carry hand tools or may require the installation of expensive closures that facilitate accessing and housing of vehicle components.

[0018] The embodiments described herein provide a latch mechanism for a bull-bar assembly that provides a cost-effective and user-friendly means for a user to access a vehicle component housed in the bull-bar assembly. In one arrangement, the bull-bar assembly includes, among other components of the bull-bar assembly, a panel that houses a vehicle component, for example, a winch for vehicle recovery. The panel, in one embodiment, defines a component aperture through which a user can access the vehicle component. The bull-bar assembly also includes, in one arrangement, a cover that blocks and unblocks the component aperture to respectively prevent dirt and debris from passing through the component aperture and contacting the vehicle component and to provide user access to the vehicle component.

[0019] The bull-bar assembly, in one arrangement, further includes a latch that facilitates

movement of the cover between an open position, in which the cover unblocks the component aperture to provide user access to the vehicle component, and a closed position, in which the cover blocks the component aperture. In one embodiment, the panel defines a latch aperture that provides user access to the latch through the panel in a similar way as the component aperture.

[0020] To prevent dirt and debris from entering the latch aperture, in one arrangement, the bull-bar assembly includes a grommet that blocks the latch aperture when installed to the panel. The grommet, when removed from the panel, provides user access to the latch. In this way, the user can engage the latch through the latch aperture to disengage the latch from the cover, which allows the cover to move to the open position away from the panel to provide access to the vehicle component through the component aperture. In one arrangement, the latch is supported by and connected to a cross-member of the bull-bar assembly that provides lateral rigidity to the bull-bar assembly.

[0021] Accordingly, the arrangements described herein advantageously provide a bull-bar assembly with easy access to a vehicle component without the need for spare tools or an expensive closure. By way of the latch, the bull-bar assembly eliminates the need for a user to carry spare tools, such as a screwdriver, to access the vehicle component. Moreover, by way of the latch's integration with the existing structure of the bull-bar assembly, the arrangements described herein eliminate the need for a closure that is costly to manufacture and install to the vehicle. Therefore, the bull-bar assembly provides a system for improving accessing a vehicle component that is both cost-effective and user-friendly.

[0022] Turning now to FIG. 1A, part of a representative passenger vehicle **100** is shown. The vehicle **100** includes an exterior and a number of interior compartments. In one arrangement, the vehicle **100** includes a body that forms the exterior and defines or otherwise encloses the compartments. The body also includes a front fascia including a grille, headlights, a front bumper, and other components standard of vehicles. As described herein, the vehicle **100** also includes a bull-bar assembly **110**. In one embodiment, the bull-bar assembly **110** includes various components that function together to serve multiple purposes in relation to the vehicle **100**. For example, the various components, described in further detail below, function to protect the front fascia, especially the headlights, from front collisions. Moreover, as described herein, the components of the bull-bar assembly **110** are used as a platform for mounting various vehicle components, for example, a winch for vehicle recovery.

[0023] With continued reference to FIGS. 1A and 1B, the components of the bull-bar assembly **110** include, for example, a bull-bar **120**, a panel **130**, and a cross-member **140** connected to the panel **130** that provides structural, lateral rigidity and support to the bull-bar assembly **110**. In one arrangement, the panel **130** houses and/or provides a mounting surface for one or more vehicle components **150**. As shown in FIG. 1B, the vehicle components **150** are a winch **150A** and a clutch **150B**. However, it should be understood that the panel **130** may house one or more other vehicle components **150**. In some instances, a person such as a user of the vehicle **100** or another user of the vehicle component **150** may need to access the vehicle component **150**. For example, a vehicle **100** user or a tow truck operator may need to access the winch **150A** for vehicle **100** recovery. While the remainder of this description references a single vehicle component **150**, it should be understood that there may be two or more vehicle components housed behind the panel **130**. Moreover, the vehicle component **150** need not be a vehicle **100** part. Rather, in some instances, the vehicle component **150** can be a control for the vehicle **100**, such as a button or a lever used to operate a portion of the vehicle **100**.

[0024] To provide access to the vehicle component **150**, the panel **130** defines, in one example, component apertures **160**. The component apertures **160** provide space to facilitate access to the vehicle component **150** by, for example, a person using one or more hands, tools, etc. As shown in FIGS. 1A and 1B, the panel **130** defines two component apertures **160**: a first component aperture **160A** and a second component aperture **160B**. The first component aperture **160A** and the second component aperture **160B** provide access to two sides of the vehicle component **150**. For example,

the first component aperture **160A** provides access to the winch **150A**, while the second component aperture **160B** provides access to the clutch **150B**.

[0025] In some instances, dirt or other debris from a surrounding environment of the vehicle **100** may enter the component apertures **160**, accumulate on the vehicle component **150**, and cause deterioration or poor performance of the vehicle component **150**. Accordingly, in one embodiment, the bull-bar assembly **110** includes covers **170** to protect the vehicle component **150** against dirt and/or debris entering through the component apertures **160**. As shown in FIG. **1A**, the bull-bar assembly **110** includes two covers **170**: a first cover **170A** corresponding to the first component aperture **160A** and a second cover **170B** corresponding to the second component aperture **160B**. As described in further detail below, the covers **170** are movable between a closed position (shown in FIGS. **1A** and **1B**), in which the covers **170** block the component apertures **160**, and an open position (described in further detail below), in which the covers **170** unblock the component apertures **160** to provide access to the vehicle component **150**.

[0026] To facilitate movement of the covers **170** between the closed and open positions, the bull-bar assembly **110** further includes, in one embodiment, latches **180** that engage with the covers **170**. For example, the bull-bar assembly **110** includes two latches: a first latch **180A** provided for the first cover **170A** and a second latch **180B** provided for the second cover **170B**. In one arrangement, the latches **180** are located behind the panel **130** and are accessible through the panel **130**. The latches **180** will be described in further detail below.

[0027] As mentioned, the latches **180** are accessible through the panel **130**. In other words, the latches **180** are located on a same side of the panel **130** as the vehicle component **150**. Accordingly, in one embodiment, the bull-bar assembly **110** includes latch apertures **190** that provide access to the latches **180**. As shown in FIG. **1A**, the bull-bar assembly **110** includes two latch apertures: a first latch aperture **190A** corresponding to the first latch **180A**, the first cover **170A**, and the first component aperture **160A** and a second latch aperture **190B** corresponding to the second latch **180B**, the second cover **170B**, and the second component aperture **160B**. Accordingly, in the embodiment shown, the first latch **190A** is accessible through the first latch aperture **190A** to engage or disengage the first cover **170A** to open or close the first component aperture **160A**, and the second latch **190B** is accessible through the second latch aperture **190B** to engage or disengage the second cover **170B** to open or close the second component aperture **160B**.

[0028] While FIGS. **1A** and **1B** show two component apertures **160**, two covers **170**, two latch apertures **190**, and two latches **180**, it should be understood that the bull-bar assembly **110**, in other embodiments, includes or otherwise defines a different number of these features. In one example, the bull-bar assembly **110** may define a single component aperture, latch aperture, cover, and latch to provide a single access point to the vehicle component **150**. In other examples, the bull-bar assembly **110** can include or otherwise define more than two of each of the aforementioned features to provide more than two access points to the vehicle component **150**. Moreover, the bull-bar assembly **110** does not need to include or otherwise define the same number of each feature. For example, it is contemplated that the bull-bar assembly **110** can define a single component aperture and a single cover but include multiple latches and define multiple latch apertures to facilitate opening and closing of the cover from multiple locations.

[0029] It should also be noted that, while FIGS. **1A** and **1B** show two groupings of a component aperture, a cover, and a latch aperture arranged in a substantially mirrored configuration, such features can take other arrangements as well and can be located with respect to the bull-bar assembly **110** in other locations. Moreover, for simplicity, the remainder of this description references the first component aperture **160A**, the first cover **170A**, the first latch **180A**, and the first latch aperture **190A** (hereinafter referred to respectively as the component aperture **160**, the cover **170**, the latch **180**, and the latch aperture **190**). It should be understood though, that in some embodiments, this description applies equally to the second component aperture **160B**, the second cover **170B**, the second latch **180B**, and the second latch aperture **190B**.

[0030] Referring now to FIG. 2A, a close-up view of a portion of FIG. 1A is shown. More specifically, FIG. 2A shows a view of the latch **180**, the latch aperture **190**, and portions of the cover **170** and the component aperture **160**. As mentioned above, dirt and/or debris from the surrounding environment of the vehicle **100** may enter the component aperture and accumulate on the vehicle component **150**. In a similar way, dirt and/or debris may also enter the latch aperture **190**, accumulate on the latch **180**, and damage or otherwise cause poor operation of the latch **180**. Accordingly, in one embodiment, the bull-bar assembly **110** includes a grommet **200** that blocks the latch aperture **190** when not in use.

[0031] In one arrangement, the grommet **200** is a flexible, seal-like component that press-fits to the panel **130** to block the latch aperture **190**. When the latch **180** needs to be accessed, the user can simply pull the grommet **200** off of the area of the panel **130** surrounding the latch aperture **190** to unblock the latch aperture **190**. In other arrangements, the grommet **200** can take other forms suitable for blocking and unblocking the latch aperture **190**. For example, the grommet **200** can instead be a cap, a seal, a sliding window, etc. Moreover, in some arrangements, the grommet **200** can unblock the latch aperture **190** without being fully removed from the panel **130**. For example, the grommet **200** can be attached to the panel **130** by a hinge, a living hinge, a cord, etc. It should also be noted that while the latch aperture **190** and the grommet **200** have corresponding circular shapes, the latch aperture **190** and/or the grommet **200** can have other shapes as well. Moreover, the grommet **200** can be made from other materials, including substantially non-flexible materials, such as hard plastic, metal, etc. Additionally, it should be noted that the grommet **200** can attach to the panel **130**, an area surrounding the panel **130**, or other locations, as long as the grommet **200** blocks the latch aperture **190**.

[0032] When the grommet **200** unblocks the latch aperture **190**, the latch **180** is accessible by a user through the latch aperture **190**. For example, a user can put a portion of his or her hand, for instance, a finger, through the latch aperture **190** to operate the latch **180** with his or her finger. As shown in FIG. 2A, the latch **180** includes various components that function together to facilitate movement of the cover to block and unblock the component aperture **160**. More specifically, in one embodiment, the latch **180** includes a pin **202**, a lever **214**, and a spring **216**, among other components described in further detail below.

[0033] Referring now to the pin **202**, in one embodiment, the pin **202** defines an elongated, substantially cylindrical shape having a portion that engages the cover **170** to hold the cover **170** in the closed position against the panel **130**. To engage the cover **170** and hold the cover **170** in a closed position, in one embodiment, the pin **202** includes a pin head **204** that engages the cover **170** through a pin aperture **206** (shown in FIG. 2B), as described in further detail below.

[0034] With continued reference to FIG. 2A, in one arrangement, the pin **202** is supported by the cross-member **140**, for example, across the cross-member **140** substantially perpendicular to the cross-member **140**. More specifically, in one example, the cross-member **140** includes an upper flange **208** and a lower flange **210** such that the cross-member **140** defines a substantially C-shaped cross section (in other words, in one example, the cross-member **140** is a C-channel rail). The upper flange **208** and the lower flange **210**, in the example shown, define cross-member slots **212**. More specifically, the upper flange **208** defines an upper cross-member slot **212A**, and the lower flange **210** defines a lower cross-member slot **212B**. The upper cross-member slot **212A** and the lower cross-member slot **212B** are, in one example, sized and shaped to receive the pin **202** such that the cross-member **140** holds the pin **202** in a substantially upright position.

[0035] As previously mentioned, the cross-member **140** is a component of the bull-bar assembly **110** that is typical of bull-bar assemblies. More specifically, the cross-member **140** provides structural rigidity to the bull-bar assembly **110**. Accordingly, installing the latch **180** to the cross-member **140** facilitates the provision of a latch **180** for opening and closing the cover **170** while reducing costs associated with the latch **180**, since the cross-member **140** is a preexisting structure for the bull-bar assembly **110**. In other words, in the illustrated arrangement, there are no additional

parts needed to install the latch **180** to the bull-bar assembly **110**. In one embodiment, the only modification needed to install the latch **180** is to machine the cross-member slots **212** into the cross-member **140**.

[0036] Referring now to the lever **214**, in one embodiment, the lever **214** is provided on the pin **202** for actuation of the latch **180** by a user. In one instance, the lever **214** has a substantially flat, elongated shape that the user presses down on with a finger. Moreover, in one example, the lever **214** has a width that is greater than the diameter of the pin **202**, which may ensure that the lever **214** has enough surface area for the user to comfortably press down on to actuate the latch **180**. In one arrangement, the lever **214** extends from the pin **202** substantially perpendicular to the pin **202** such that, when the user presses down on the lever **214** in a direction that is substantially along an axis of the pin **202**, the pin **202** moves down in the same direction to disengage the cover **170**. In some instances, the lever **214** is formed as a component that is separate from the pin **202** and that is later attached to the pin **202** by adhesive, welding, etc. In other instances, the lever **214** and the pin **202** may be integrally formed as a unitary component, for example, by 3D-printing the lever **214** and the pin **202** together.

[0037] Referring now to the spring **216**, in one embodiment, the spring **216** is provided around the pin **202** between the lever **214** and the lower flange **210** of the cross-member **140**. Accordingly, the spring **216** biases the lever **214** to the unactuated position to keep the cover **170** in the closed position when the lever **214** is not engaged by a user. Thus, in the actuated position, the lever **214** is pressed down, the spring **216** compresses, and the latch **180** is moved to the actuated position. When the user no longer engages the lever **214**, the spring **216** decompresses, the lever **214** is moved up, and the latch **180** returns to the unactuated position to hold the cover **170** in the closed position against the panel **130**.

[0038] Moreover, in some instances, the spring **216** limits movement of the pin **202** in a downward direction. To limit movement of the pin **202** in the upward direction (e.g., to prevent the pin head **204** from damaging the cover **170**), the pin **202** may define a larger diameter below the upper flange **208** of the cross-member **140**. In this way, in one embodiment, the larger portion of the pin **202** abuts the upper flange **208** when the latch **180** is in the unactuated position so that the pin **202** cannot be moved up and potentially damage the cover **170**.

[0039] In addition to moving up and down, in some instances, the pin **202** may be able to move along the cross-member slots **212**, which may cause friction between the pin **202** and the cross-member **140**, causing the components to wear. Moreover, if the pin **202** moves within the cross-member slots **212**, the pin **202** may not be able to align correctly with respect to the cover **170** to hold the cover **170** in the closed position. Accordingly, in one embodiment, the latch **180** includes plates **218** that function to hold the pin **202** in place with respect to the cross-member slots **212** while allowing movement of the pin **202** in the up and down directions.

[0040] Examples of the plates **218** are shown in FIGS. 2A and 2B. As shown, in one arrangement, the plates **218** include an upper plate **218A** and a lower plate **218B**. The upper plate **218A** and the lower plate **218B**, in one example, include plate slots **220**. As shown, the plate slots **220** include a first plate slot **220A** and a second plate slot **220B**. The plate slots **220** are, in one embodiment, sized and shaped to receive the pin **202**. Moreover, in the example shown, the upper plate **218A** and the lower plate **218B** are oriented such that the openings of the plate slots **220** face in a direction substantially opposite from the openings of the cross-member slots **212**. More specifically, in one embodiment, the cross-member slots **212** have an arrangement in which openings of the cross-member slots **212** faces away from the vehicle **100**, while the plate slots **220** have openings facing toward the vehicle **100**. In this way, the plate slots **220** and the cross-member slots **212** function together to retain the pin **202** within the cross-member **140**.

[0041] The upper plate **218A**, in one arrangement, rests against an outside surface of the upper flange **208**, and the lower plate **218B**, in one arrangement, rests against an outside surface of the lower flange **210**. In another arrangement, though, the upper plate **218A** may rest against an inside

surface of the upper flange **208**, and/or the lower plate **218B** may rest against an inside surface of the lower flange **210**. In either arrangement, or in other arrangements, the upper plate **218A** and/or the lower plate **218B** are connected to the cross-member **140** by bolts **222** and nuts **224**, as shown in FIG. 2. However, it should be understood that the upper plate **218A** and/or the lower plate **218B** can be connected to the cross-member **140** in other manners, for example, by adhesive, by welding, etc.

[0042] As mentioned above, in some instances, the pin **202** has a substantially cylindrical shape. Because of its cylindrical shape, the pin **202** may be susceptible to spinning within the cross-member slots **212** and/or the plate slots **220**. This may cause wear and tear to the pin **202**, the cover **170**, the cross-member **140**, and the plates **218**. Accordingly, in one embodiment, the pin **202** has one or more features to limit its rotation within the cross-member **140** and the plates **218**. For example, the pin **202** includes an anti-rotation step **226**. In one arrangement, the anti-rotation step **226** is a flat portion of the pin **202** that contacts the upper plate **218A** and/or the lower plate **218B** to prevent the pin **202** from spinning within the plate slots **220**. In some instances, the plate slots **220** may define a flat edge that aligns with the anti-rotation step **226** to prevent spinning of the pin **202**.

[0043] Referring now to FIG. 2B, an example view of the pin **202** engaged with the cover **170** is shown. In one embodiment, the cover **170** defines an edge **228**. The edge **228**, in one example, extends substantially perpendicular to the cover **170** around at least a portion of a perimeter of the cover **170**. In one arrangement, the edge **228** defines the pin aperture **206** through which the pin head **204** engages the cover **170** to hold the cover **170** against the panel **130** in the closed position. In some instances, the edge **228** may not be wide enough to reach the pin head **204** to facilitate closing of the cover **170**. Accordingly, in another arrangement, for example, as shown in FIG. 2B, the cover **170** includes a tab **230**. The tab **230** is, in one approach, connected to the edge **228**, extends out from the edge **228**, and includes the pin aperture **206** that engages the pin head **204**. In some instances, it is advantageous to provide the tab **230** rather than extending the entire edge **228**, as it reduces the amount of material, and thus cost, needed to make the cover **170**.

[0044] Referring now to FIGS. 3A and 3B, examples of cross-sectional side view of the bull-bar assembly **110** are shown, depicting the cover **170** in the closed position and the latch **180** in the unengaged position (FIG. 3A) and the cover **170** in the open position and the latch **180** in the engaged position (FIG. 3B). As mentioned above, the cover **170** includes a pin aperture **206** through which the pin head **204** engages the cover **170** to hold the cover **170** against the panel **130** in the closed position. An example of the pin aperture **206** is shown in both FIGS. 3A and 3B. In one arrangement, the pin aperture **206** has a diameter greater than a tip of the pin head **204** but smaller than a base of the pin head **204**. In other words, in some instances, the pin head **204** has a tapered shape that functions to self-align the pin head **204** within the pin aperture **206**.

[0045] Moreover, as shown in FIGS. 3A and 3B, in one arrangement, the cover **170** is attached to a back side of the panel **130** by a hinge **300**. The hinge **300**, in one or more examples, is connected to the panel **130** and to the cover **170** to facilitate movement of the cover **170** away from the panel **130** in a direction toward the vehicle **100** to unblock the component aperture. In other examples, though, the cover **170** may be connected a front side of the panel **130** such that when the latch **180** is engaged, the cover **170** is able to open in front of the panel **130** and in a direction away from the vehicle **100**.

[0046] Referring now to FIG. 3A, an example of the latch **180** in an unactuated position is shown. In the unactuated position, the spring **216** biases the pin **202** to engage the pin head **204** with the pin aperture **206** and hold the cover **170** in the closed position against the panel **130**. Referring now to FIG. 3B, an example of the latch **180** in the actuated position is shown. As mentioned above, a user can actuate the latch **180** to open the cover **170** by pressing down on the lever **214** with a finger. It should be noted that the user does not have to use a finger to actuate the latch **180**. In other examples, the user can use multiple fingers, a portion of a hand, a tool, etc. to actuate the

latch **180** and open the cover **170**. As shown in FIG. 3B, when the latch **180** is in the actuated position, the lever **214** is moved downward, and the spring **216** is compressed. As the lever **214** moves downward, the pin **202** also moves downward, and the pin head **204** disengages the pin aperture **206**, allowing the cover **170** to be moved to an open position.

[0047] In some instances, the cover **170** is moved to the open position (e.g., a user moves the cover **170** to the open position) by pushing the cover **170** in a direction toward the vehicle **100** (e.g., along a longitudinal axis of the vehicle **100** from the front to the back of the vehicle **100**) with hand, a finger, a tool, etc. When the cover **170** is in the open position, as shown in FIG. 3B, the cover **170** unblocks the component aperture to provide access to the vehicle component **150**. As mentioned above, in one arrangement, the user accesses the vehicle component **150** through the component aperture. Accordingly, the component aperture can have a size that is suitable to provide hand space for the user to access the vehicle component **150**. More specifically, in one example, the component aperture can have a size that is large enough for a user to pass a hand and, if needed, part of their arm, through the component aperture to access the vehicle component **150**.

[0048] In some instances, the user may hold the cover **170** in the open position while accessing the vehicle component **150**. In one instance, the user's arm holds the cover **170** in the open position while the user uses their hand to access the vehicle component **150**. In another instance, the user can hold the cover **170** in the open position with one hand while using their other hand to access the vehicle component **150**.

[0049] When the user no longer needs access to the vehicle component **150**, the user can remove their hand, finger, and/or arm from the component aperture **160**. Doing so allows the cover **170** to fall under its own weight and return to the closed position to block the component aperture **160**. The user can then, in one embodiment, re-engage the latch **180** to allow the pin **202** to re-engage the pin aperture **206** to hold the cover **170** in the closed position against the panel **130**.

[0050] While the description herein makes reference to a user, e.g., a human user of the bull-bar assembly, it should be understood that the user, in other instances, may be a non-human user such as a mechanical/robotic device.

[0051] As mentioned previously, the arrangements described herein have the benefit of providing a bull-bar assembly with easy access to a vehicle component without the need for spare tools or an expensive closure. By way of the latch, the bull-bar assembly eliminates the need for a user to use spare tools, such as a screwdriver, to access the vehicle component. Moreover, by way of the latch's integration with the existing structure of the bull-bar assembly, the arrangements described herein eliminate the need for a closure that is costly to manufacture and install to the vehicle. Therefore, the bull-bar assembly provides a system for accessing a vehicle component that is both cost-effective and user-friendly.

[0052] Detailed embodiments are disclosed herein. However, it is to be understood that the disclosed embodiments are intended only as examples. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the aspects herein in virtually any appropriately detailed structure. Further, the terms and phrases used herein are not intended to be limiting but rather to provide an understandable description of possible implementations. Various embodiments are shown in FIGS. 1-3B, but the embodiments are not limited to the illustrated structure or application.

[0053] The terms “a” and “an,” as used herein, are defined as one or more than one. The term “plurality,” as used herein, is defined as two or more than two. The term “another,” as used herein, is defined as at least a second or more. The terms “including” and/or “having,” as used herein, are defined as comprising (i.e., open language). The phrase “at least one of . . . and . . .,” as used herein, refers to and encompasses any and all possible combinations of one or more of the associated listed items. As an example, the phrase “at least one of A, B, and C” includes A only, B only, C only, or any combination thereof (e.g., AB, AC, BC, OR ABC).

[0054] The term “substantially” and/or “about,” as used herein, include exactly the term it modifies and slight variations therefrom. Thus, the term “substantially parallel” means exactly parallel and slight variations therefrom. “Slight variations therefrom” can include within 15 degrees/percent/units or less, within 14 degrees/percent/units or less, within 13 degrees/percent/units or less, within 12 degrees/percent/units or less, within 11 degrees/percent/units or less, within 10 degrees/percent/units or less, within 9 degrees/percent/units or less, within 8 degrees/percent/units or less, within 7 degrees/percent/units or less, within 6 degrees/percent/units or less, within 5 degrees/percent/units or less, within 4 degrees/percent/units or less, within 3 degrees/percent/units or less, within 2 degrees/percent/units or less, or within 1 degrees/percent/units or less. In some examples, “substantially” can include being within normal manufacturing tolerances.

[0055] In this description, uses of “front,” “forward,” and the like, and uses of “rear,” “rearward,” and the like, refer to the longitudinal directions of the vehicle. “Front,” “forward,” and the like refer to the front (fore) of the vehicle, while “rear,” “rearward,” and the like refer to the back (aft) of the vehicle. Uses of “side,” “sideways,” “transverse,” and the like refer to the lateral directions of the vehicle. Uses of “above,” “below,” and the like refer to the vertical directions of the vehicle.

[0056] In this description, in one arrangement, the compartments of the vehicle include a passenger compartment, an engine compartment, a cargo area, and the like. Among other things, in one arrangement, the vehicle includes seats, a dash assembly, an instrument panel, controls, and the like housed in the passenger compartment. Additionally, in some instances, the vehicle may include an engine, a motor, a transmission, and the like, as well as other powertrain components, such as wheels, housed in the engine compartment and elsewhere in the vehicle. The wheels support the remainder of the vehicle on the ground. One, some or all of the wheels are powered by the remainder of the powertrain components to drive the vehicle along the ground.

[0057] Aspects herein can be embodied in other forms without departing from the spirit or essential attributes thereof. Accordingly, reference should be made to the following claims, rather than to the foregoing specification, as indicating the scope thereof.

Claims

1. A bull-bar assembly for a vehicle, comprising: a panel defining a component aperture through which a vehicle component is accessible, the panel further defining a latch aperture; a cover attached to the panel and movable between a closed position, in which the cover blocks the component aperture, and an open position, in which the cover unblocks the component aperture; and a latch accessible through the latch aperture and movable between an actuated position, in which the latch disengages the cover to unblock the component aperture, and an unactuated position, in which the latch engages the cover to block the component aperture.
2. The bull-bar assembly of claim 1, wherein the vehicle component is a winch that is housed between the panel and the vehicle, wherein the latch is located on a same side of the panel as the winch, and wherein the component aperture and the latch aperture provide hand space for a user to respectively access the winch and the latch through the panel.
3. The bull-bar assembly of claim 1, further comprising a cross-member that provides lateral, structural support for the bull-bar assembly, the cross-member further defining flanges defining cross-member slots, and wherein the latch includes a pin that is received by the cross-member slots such that the cross-member supports the pin.
4. The bull-bar assembly of claim 3, further comprising plates having plate slots that retain the pin within the cross-member slots.
5. The bull-bar assembly of claim 1, wherein the latch includes: a pin that engages the cover to hold the cover against the panel when the latch is in the unactuated position and that disengages the cover to allow the cover to open away from the panel when the latch is in the actuated position; and

a lever provided on the pin to facilitate movement of the pin between the unactuated position and the actuated position.

6. The bull-bar assembly of claim 5, further comprising a spring surrounding the pin between the lever and a cross-member to which the latch is installed, wherein the spring biases the pin to the unactuated position, and wherein the lever is moveable from the unactuated position to the actuated position when the lever is pressed and the spring is compressed.

7. The bull-bar assembly of claim 5, wherein the pin defines a pin head having a tapered shape, and wherein the cover defines a pin aperture that receives the pin head such that the pin head retains the cover against the panel in the closed position.

8. The bull-bar assembly of claim 7, wherein the cover defines an edge extending substantially perpendicular to the cover around at least a portion of a perimeter of the cover, and further comprising a tab extending from the edge and defining the pin aperture.

9. The bull-bar assembly of claim 5, wherein the pin defines an anti-rotation step that prevents the pin from rotating when the latch is installed to a cross-member of the bull-bar assembly.

10. The bull-bar assembly of claim 1, further comprising a grommet that attaches to the panel to block the latch aperture.
