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### Greaseable hinge for a snow wing

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#### Abstract

In some implementations, coupling system for rotatably coupling a moldboard of a snow wing assembly includes a hinge for rotatably coupling the moldboard to a linkage assembly to enable the moldboard to rotate in a first rotational direction, the hinge including a plate having a first face and a second face. The plate includes a first passageway extending between the first face and the second face to facilitate lubricant being supplied to a first interface between the plate and the moldboard. The coupling system may include a pin extending through the moldboard and the plate to rotatably couple the moldboard with the hinge. The pin enables the moldboard to rotate in a second rotational direction about a rotational axis defined by a body of the pin, and the body includes a second passageway extending from a bottom portion of the pin to an outer surface of the pin.

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## Background/Summary

### TECHNICAL FIELD

(1) The present disclosure relates generally to a coupling system for coupling a snow wing to a motor grader and, for example, to a greaseable hinge for the snow wing.

### BACKGROUND

(2) Different components may be coupled (e.g., rotatably) to one another via couplers or coupling systems or assemblies. For example, one or more components of a machine may be rotatably coupled to facilitate operation of the machine. As an example, machines, such as grader machines (e.g., motor graders), may use a snow wing (e.g., often including a moldboard or other snow blade) to displace, move, distribute, and/or grade snow and/or other material. The snow wing may need to

be moved to various positions relative to a work surface and/or the grader machine to effectively carry out one or more of the functions described above and/or to enable other operations of the grader machine. For example, the snow wing may be mounted on a side of a cab of the grader machine and may need to be moved to various positions to enable the grader machine to operate without using the snow wing and/or to enable an operator to enter or exit the cab.

(3) To enable the snow wing to be moved to various positions, the snow wing may be rotatably coupled to the grader machine (e.g., to an undercarriage assembly of the grader machine). For example, the snow wing may be rotatably mounted to a hinge to enable the snow wing to rotate in a first rotational direction. The hinge may be rotatably mounted to another assembly of the grader machine to enable the snow wing to rotate in a second rotational direction. To facilitate the coupling of the snow wing (e.g., a moldboard of the snow wing) to the hinge, a coupling assembly may be used. The coupling assembly may include a pin that is passed through the moldboard and the hinge to rotatably couple the moldboard with the hinge (e.g., via a nut, such as a castle nut). However, over time, the coupling assembly and/or pin may become susceptible to seizure within the components (e.g., the moldboard and/or the hinge) via which they contact (e.g., due to the harshness of conditions in which the grader machine operates).

(4) The hinge and/or coupling system of the present disclosure solves one or more of the problems set forth above and/or other problems in the art.

## SUMMARY

(5) In some implementations, a hinge for a rotatably coupling a linkage assembly of a motor grader with a moldboard of a snow wing assembly of the motor grader includes a first plate configured to mate with a second plate of the moldboard, the first plate including a first grease passageway to enable grease to pass from a first surface of the first plate to a second surface of the first plate, wherein the second surface is configured to mate with the second plate of the moldboard; and a pin having a cylindrical body, that defines a rotational axis, extending approximately perpendicular with respect to the second surface of the first plate, wherein the pin passes through the first plate and the second plate to rotatably couple the linkage assembly to the snow wing assembly to enable the moldboard to rotate with respect to the rotational axis, and wherein the cylindrical body includes a second grease passageway to enable grease to pass from a bottom surface of the cylindrical body to an outer surface of the cylindrical body.

(6) In some implementations, a coupling system for rotatably coupling a moldboard of a snow wing assembly includes the moldboard having a curved surface and a first plate disposed on a backside of the curved surface; a linkage assembly for attaching the snow wing assembly to a motor grader, the linkage assembly configured to raise or lower the moldboard; a hinge for rotatably coupling the moldboard to the linkage assembly to enable the moldboard to rotate in a first rotational direction, the hinge including a second plate having a first face and a second face, wherein the second plate is configured to mate with the first plate of the moldboard; and wherein the second plate includes a first passageway extending between the first face and the second face to facilitate lubricant being supplied to a first interface between the first plate and the second plate; and a pin extending through the moldboard, the first plate, and the second plate to rotatably couple the moldboard with the hinge, wherein the pin enables the moldboard to rotate in a second rotational direction about a rotational axis defined by a body of the pin, and wherein the body of the pin includes a second passageway extending from a bottom portion of the pin to an outer surface of the pin.

(7) In some implementations, a motor grader includes a snow wing assembly including a moldboard, the moldboard including a curved surface, a first plate disposed proximate to a backside of the curved surface, and an aperture; a linkage assembly configured to link the snow wing assembly to an undercarriage assembly of the motor grader; a hinge for rotatably coupling the moldboard to the linkage assembly, the hinge including a second plate having a first face and a second face, wherein the second face of the second plate is configured to mate with a surface of the first plate of the moldboard; and a pin extending through the aperture of the moldboard, the first

plate, and the second plate to rotatably couple the moldboard with the hinge, wherein the pin enables the moldboard to rotate in a first rotational direction about a rotational axis defined by a cylindrical body of the pin, wherein at least one of the cylindrical body of the pin or the second plate of the hinge includes a grease passageway to facilitate a supply of grease to one or more interfaces associated with the moldboard, the hinge, or the pin.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

- (1) FIG. 1 is a side view of a motor grader described herein.
- (2) FIG. 2 is a perspective view of a coupling system described herein.
- (3) FIG. 3 is a perspective view of a coupling system described herein.

### DETAILED DESCRIPTION

(4) Reference will now be made in detail to specific embodiments or features, examples of which are illustrated in the accompanying drawings. Generally, corresponding reference numbers will be used throughout the drawings to refer to the same or corresponding parts.

(5) This disclosure relates to a hinge and/or coupling system, which is applicable to any machine that includes a mounted snow wing. For example, the machine may be a grader machine (e.g., a motor grader), a plow truck, a dump truck, a dozer, a backhoe loader, a tractor, an excavator, or another vehicle. In other words, although examples are described herein in connection with a motor grader, the hinge and/or coupling system described herein may be similarly applied to any machine that includes a mounted snow wing.

(6) FIG. 1 is a side view of a motor grader **100** described herein. The motor grader **100** may also be referred to as a grader machine, among other examples. The motor grader **100** may be used to displace, spread, distribute, level, and grade materials **102**, such as snow or soil, over a work surface **104**. Generally, a grading operation is performed during machine movement, and for this purpose, the motor grader **100** may include traction devices **106** that facilitate machine movement over the work surface **104**. For example, traction devices **106** include a set of front wheels **108** disposed towards a front end **112** of the motor grader **100** and a set of rear wheels **110** disposed towards a rear end **114** of the motor grader **100**. The terms “front” and “rear”, as used herein, are in relation to an exemplary direction of travel of the motor grader **100**, as represented by arrow, T, in FIG. 1, with the direction of travel being exemplarily defined from the rear end **114** towards the front end **112**. The motor grader **100** defines a length, L, between the front end **112** and the rear end **114**.

(7) A movement of the traction devices **106** (e.g., a rotation of the set of front wheels **108** and the set of rear wheels **110**) may be powered by a power source, such as an engine (not shown in FIG. 1), housed in a power compartment **116** of the motor grader **100**. Further, the motor grader **100** may include a main frame portion **118** and a sub-frame portion **120**. The main frame portion **118** may also be referred to herein as an undercarriage assembly of the motor grader **100**. The sub-frame portion **120** may be movable relative to the main frame portion **118**. Further, the motor grader **100** may include an operator cab **122** supported on the sub-frame portion **120**. The operator cab **122** may house various controls of the power source and other functions of the motor grader **100**.

(8) To grade and level the materials **102**, the motor grader **100** may include a drawbar-circle-blade (DCB) arrangement or a drawbar-circle-moldboard (DCM) arrangement, which may also be referred to as a grader group **124**. The grader group **124** may be supported by the sub-frame portion **120**, and may include a drawbar **126**, a circle member **128**, and a blade **130** (referred to as a moldboard), each of which may function in concert to perform a grading operation on the work surface **104**.

(9) As shown in FIG. 1, the motor grader **100** may also include a snow wing assembly **132**

mounted on the motor grader **100**. For example, the snow wing assembly **132** may be mounted to the main frame portion **118**. The snow wing assembly **132** may be mounted on a side of the motor grader **100** (e.g., on a side of the operator cab **122**). For example, as shown in FIG. **1**, the snow wing assembly **132** may be mounted on the right hand side of the operator cab **122** relative to the direction of travel **T**. In other examples, the snow wing assembly **132** may be mounted on the left hand side of the operator cab **122** relative to the direction of travel **T**. The snow wing assembly **132** may include a moldboard **134**. The moldboard **134** may also be referred to as a blade, a plow, and/or a snowplow, among other examples. The moldboard **134** may include a surface **136**, such as a curved surface or a concave surface, that may help receive and agglomerate the materials **102** over the work surface **104**. As an example, the moldboard **134** may define an edge **138** at a bottom end (e.g., closer to the work surface **104**) of the surface **136** to help engage and scrape the materials **102** off the work surface **104** and distribute, level, and grade the work surface **104**, during a grading operation.

(10) The snow wing assembly **132** may be mounted to the motor grader **100** via a linkage assembly **140**. The linkage assembly **140** may be coupled to the motor grader **100** (e.g., via the main frame portion **118**). The linkage assembly **140** may be configured to link the snow wing assembly **132** to an undercarriage assembly (e.g., the main frame portion **118**) of the motor grader **100**. The linkage assembly **140** may include one or more lifting mechanisms, such as one or more actuators (e.g., hydraulic actuators and/or pneumatic actuators) configured to raise and/or lower the snow wing assembly along a direction **142**. The direction **142** may be referred to as a bench height. The linkage assembly **140** may include a mast (e.g., that may include a bar along which the snow wing assembly **132** is raised and/or lowered). In other examples, the linkage assembly **140** may be a mast-less assembly, such as a four-bar linkage assembly.

(11) The snow wing assembly **132** may enable the motor grader **100** to perform a benching application, which may involve grading and/or distributing materials **102** from an elevated surface (e.g., elevated relative to the work surface **104**). For example, the moldboard **134** may be used to remove, grade, or distribute snow from a top portion of a bank. The moldboard **134** may include an outboard end **144** and an inboard end **146**. “Outboard” and “inboard” may be relative to the motor grader **100** and/or the operator cab **122**. For example, the moldboard **134** may have an approximately rectangular configuration having two long edges (e.g., the edge **138** and the corresponding edge approximately parallel to the edge **138**) and two short edges (e.g., at the outboard end **144** and the inboard end **146**). As shown in FIG. **1**, the snow wing assembly **132** may be coupled to the linkage assembly **140** proximate to the inboard end **146** of the moldboard **134**. In other words, the moldboard **134** may be coupled to the linkage assembly **140** proximate to one of the short edges (e.g., at the outboard end **144** and the inboard end **146**) of the moldboard **134**.

(12) The snow wing assembly **132** may be coupled to the linkage assembly **140** via a coupling system **200**. The coupling system **200** is depicted and described in more detail in connection with FIGS. **2** and **3**. The coupling system **200** may enable the snow wing assembly **132** to rotate in multiple rotational directions. For example, the coupling system **200** may enable the snow wing assembly **132** (e.g., and the moldboard **134**) to rotate in a first rotational direction **148** (e.g., about a rotational axis **202** defined by a pin **204** of the coupling system **200**, depicted in FIG. **3**). For example, the snow wing assembly **132** may include an actuator **150**, such as a hydraulic actuator or a pneumatic actuator, among other examples. The actuator **150** may be coupled to the main frame portion **118** (e.g., proximate to the rear end **114** of the motor grader **100**) and to the moldboard **134** (e.g., proximate to the outboard end **144** of the moldboard **134**). The actuator **150** may be configured to raise and/or lower the outboard end **144** of the moldboard **134** to cause the moldboard **134** to rotate about the rotational axis **202** (e.g., in the first rotational direction **148**). This may enable the moldboard **134** to adapt to different angles of terrain of a working surface of the moldboard **134**.

(13) The coupling system **200** may also enable the snow wing assembly **132** (e.g., and the

moldboard **134**) to rotate in a second rotational direction **152** (not shown in FIG. **1**). The second rotational direction **152** may enable the outboard end **144** of the moldboard **134** to move closer to and/or further from the motor grader **100** (e.g., from the operator cab **122** of the motor grader **100**). For example, the inboard end **146** of the moldboard **134** may be fixed at the coupling system **200**, and the outboard end **144** of the moldboard **134** may be free to rotate in the first rotational direction **148** and the second rotational direction **152**. The coupling system **200** may enable the moldboard **134** to rotate in the second rotation direction **152** via a hinge **206** that is rotatably coupled to the linkage assembly **140** (e.g., as depicted and described in more detail in connection with FIGS. **2** and **3**). The second rotational direction **152** may enable the snow wing assembly **132** to be placed into an operational state (e.g., with the outboard end **144** of the moldboard **134** extended away from the operator cab **122**) or a stored state (e.g., with the outboard end **144** of the moldboard **134** rotated proximate to the operator cab **122**). For example, the stored state may enable the motor grader **100** to operate without the snow wing assembly protruding from the side of the motor grader **100**.

(14) As indicated above, FIG. **1** is provided as an example. Other examples may differ from what is described with regard to FIG. **1**.

(15) FIG. **2** is a perspective view of the coupling system **200** described herein. The perspective view depicted in FIG. **2** is a back perspective view of the coupling system **200**. As shown in FIG. **2**, the coupling system **200** may include the hinge **206** rotatably coupled to the moldboard **134** via the pin **204**. The pin **204** may include a substantially cylindrical body **208** (shown in FIG. **3**) that defines a rotational axis **202**. The rotational axis **202** may define an axis from which the first rotational direction **148** is defined (e.g., the coupling system **200** may enable the moldboard **134** to rotate with respect to the rotational axis **202** in the first rotational direction **148**).

(16) The hinge **206** may be rotatably coupled to the linkage assembly **140**. The hinge **206** may be configured to rotate in the second rotational direction **152** (shown in FIG. **3**) (e.g., about a rotational axis that is substantially perpendicular to the rotational axis **202**) via the rotatable connection with the linkage assembly **140**. For example, the linkage assembly **140** may include a bar **154** (e.g., depicted in FIG. **3**). The hinge **206** may be rotatably coupled around the bar **154** to enable the hinge **206** to rotate in the second rotational direction **152**. The hinge **206** may be moveably connected to the linkage assembly **140** to enable the hinge **206** to move relative to the linkage assembly **140** in the direction **142** (shown in FIG. **1**) (e.g., that is substantially perpendicular to the rotational axis **202**). For example, the hinge **206** may be configured to slide along the bar **154** in the direction **142** to enable the bench height of the moldboard **134** to be changed.

(17) The moldboard **134** may include a plate **156**. The plate **156** may facilitate a connection with the hinge **206**. For example, the plate **156** may provide an approximately flat or smooth surface on the back side **158** of the moldboard **134** to provide a mating surface between the moldboard **134** and the hinge **206** (e.g., because the moldboard **134** may have a curved or concave configuration, as described above). The hinge **206** may include a plate **212**. The plate **212** may include a first surface **214** (e.g., a first side or a first face) and a second surface **216** (e.g., a second side or a second face). As shown in FIG. **2**, the plate **212** may be configured to mate with the plate **156** of the moldboard **134** (e.g., to facilitate a connection between the moldboard **134** and the hinge **206**). For example, the second surface **216** may be configured to mate with a surface **160** of the plate **156**. As described above, the connection between the moldboard **134** and the hinge **206** (e.g., between the plate **156** and the plate **212**) may be a rotatable connection in that the moldboard **134** is configured to rotate in the first rotational direction **148** while the hinge **206** remains static with respect to the first rotational direction **148** (e.g., does not rotate in the first rotational direction **148**).

(18) The plate **212** may include one or more passageways **218** (e.g., grease passageways and/or lubricant passageways). For example, the one or more passageways **218** may be apertures or tunnels through the plate **212**. The one or more passageways **218** may enable grease and/or

lubricant to pass from the first surface **214** (e.g., the first side) of the plate **212** to the second surface **216** (e.g., the second side) of the plate **212**. In other words, the one or more passageways **218** may provide a passageway from the first surface **214** of the plate **212** to a first interface **220** of the coupling system **200** (e.g., between the plate **212** and the plate **156**). A passageway **218** may include an inlet **222** disposed on the first surface **214**. The inlet **222** may be an opening or an aperture in the first surface **214**. In some examples, the first surface **214** may include multiple inlets **222**. In other examples, the first surface **214** may include a single inlet **222** that is connected to a single passageway **218** or to multiple passageways **218**. The plate **212** may include a fitting **224** disposed at an inlet **222** of a passageway **218**. The fitting **224** may be a grease fitting, a lubricant fitting, a grease zerk, a grease nipple, and/or a zerk fitting, among other examples. The fitting **224** may enable grease or other lubricant to be received within the passageway **218** (e.g., the fitting **224** may provide a connection for a grease gun or other component to deliver grease or lubricant into the passageway **218**). In some examples, each inlet **222** may include a fitting **224** disposed at the inlet **222**.

(19) The pin **204** may include one or more passageways **226** (e.g., grease passageways and/or lubricant passageways). For example, a passageway **226** may be an aperture or tunnel through the pin **204**. The one or more passageways **226** may enable grease and/or lubricant to pass from a bottom surface **228** of the body **208** of the pin **204** to an outer surface **230** (shown in FIG. 3) of the body **208** of the pin **204**. In other words, the one or more passageways **226** may provide a passageway from bottom surface **228** of the pin **204** to a second interface **232** of the coupling system **200** (e.g., between the pin **204** and the moldboard **134**). A passageway **226** may include an inlet **234** disposed at the bottom surface **228** of the pin **204**. The inlet **234** may be an opening or an aperture through which grease or other lubricant is enabled to be received within the passageway **226**.

(20) For example, the pin **204** may pass through the plate **212** and the plate **156** to rotatably couple the linkage assembly **140** to the snow wing assembly **132** and to enable the moldboard **134** to rotate with respect to the rotational axis **202** (e.g., in the first rotational direction **148**). The moldboard **134** may include an aperture **162** (e.g., also shown in FIG. 1). The aperture **162** may be configured to rotatably receive the pin **204**. The pin **204** may extend through the aperture **162**, the plate **212**, and the plate **156** to enable the moldboard **134** to be rotatably coupled to the hinge **206**. The second interface **232** may be between the outer surface **230** of the pin **204** and an inner surface of the aperture **162** of the moldboard **134**. The moldboard **134** may be configured to rotate in the first rotational direction **148** while the pin **204** remains relatively static with respect to the first rotational direction **148**.

(21) The pin **204** may include a bottom portion **236**. The bottom portion **236** may have a first cross-sectional area that is larger than a second cross-sectional area of the body **208**. The bottom portion **236** may be configured to contact the first surface **214** of the plate **212** to restrict a movement of the pin **204**. For example, the bottom portion **236** may at least partially restrict a movement of the pin **204** in a direction parallel to the rotational axis **202** (e.g., by contacting the first surface **214** of the plate **212**). The bottom portion **236** may be integrally attached to the body **208**. In some examples, the bottom portion **236** may be removable from the body **208** of the pin **204**. For example, the bottom portion **236** of the pin **204** may be connected to the body **208** via a threaded connection or another means that enables the bottom portion **236** to be removed from the body **208**.

(22) As indicated above, FIG. 2 is provided as an example. Other examples may differ from what is described with regard to FIG. 2.

(23) FIG. 3 is a perspective view of the coupling system **200** described herein. The perspective view depicted in FIG. 3 is a front perspective view of the coupling system **200**. FIG. 3 does not depict the moldboard **134**. However, it should be understood that the moldboard **134** may be configured in the coupling system **200** in a similar manner as depicted and/or described above (e.g., rotatably coupled to the pin **204** and/or the hinge **206**).

(24) In some implementations, the hinge **206** may include a sleeve **238**. The sleeve **238** may be slidably mounted to the bar **154**. For example, the sleeve **238** may be configured around the bar **154** to enable the hinge **206** to slide along the bar **154**. In some examples, the linkage assembly **140** may include a collar **164** coupled to an actuator (e.g., a hydraulic actuator or cylinder) of the linkage assembly **140**. The actuator may be configured to raise and/or lower the collar **164**. The collar **164** may raise and/or lower the hinge **206** along the bar **154** by coming into contact with a top surface **240** of the hinge **206**. In some other implementations, the hinge **206** may be coupled to the linkage assembly **140** such that the hinge **206** is not enabled to move relative to the linkage assembly **140** (e.g., the hinge **206** may be immovably coupled to the linkage assembly **140**).

(25) The hinge **206** may be enabled to rotate in the second rotational direction **152**. For example, the sleeve **238** may be configured to rotate about the bar **154**. In other words, the second rotational direction **152** may be defined by an axis of the bar **154**. By enabling the hinge **206** to rotate in the second rotational direction **152**, the coupling system **200** may enable the moldboard **134** (and/or the snow wing assembly **132**) to rotate in the second rotational direction.

(26) The hinge **206** may include one or more outlets **242** for the one or more passageways **218** of the hinge **206**. For example, the one or more outlets **242** may be disposed on the second surface **216** of the plate **212** (e.g., the surface associated with the first interface **220**). For example, a passageway **218** may include a single inlet **222** and a single outlet **242**. In some other examples, a passageway **218** may include a single inlet **222** and multiple outlets **242** (e.g., dispersed around the second surface **216**). The outlet(s) **242** may enable grease and/or other lubricant to be received in the first interface **220** (e.g., between the plate **212** of the hinge **206** and the plate **156** of the moldboard **134**). Multiple outlets **242** may improve a disbursement of grease or lubricant about the first interface **220**.

(27) In some examples, the hinge **206** may include one or more grooves **244**. The one or more grooves **244** may be disposed on the second surface **216** of the plate **212**. A groove **244** may extend into the plate **212** from the second surface **216**. For example, the one or more grooves **244** may be channels or trenches disposed on the second surface **216**. The one or more grooves **244** may be referred to as grease grooves. For example, a groove **244** may provide a path for grease or other lubricant provided to the second surface **216** to facilitate a disbursement of the grease or other lubricant around the second surface **216**. In other words, the second surface **216** may include one or more grooves **244** extending into the plate **212** to facilitate a distribution of lubricant in the first interface **220**. For example, an outlet **242** of a passageways **218** may be disposed at, or proximate to, a groove **244** (e.g., a passageway **218** may include one or more openings in the second surface **216** disposed at the one or more grooves **244**). In some examples, as shown in FIG. 3, a groove **244** may be an approximately circular groove or circular channel (e.g., about the pin **204**). In other examples, a groove **244** may follow a straight line, may have a rectangular configuration, or another configuration.

(28) The pin **204** may have a substantially cylindrical body **208** (e.g., the pin **204** may have a substantially cylindrical configuration). The pin **204** may extend through an aperture in the plate **212**. Similarly, the pin **204** may extend through the aperture **162** of the moldboard **134**. In some examples, the pin **204** may be statically received in the aperture in the plate **212** and rotatably received in the aperture **162** of the moldboard **134**. In other examples, the pin **204** may be rotatably received in both the aperture in the plate **212** and the aperture **162** of the moldboard **134**. The pin **204** may include one or more outlets **246** disposed on the outer surface **230** of the pin **204** (e.g., of the body **208**). The outlet(s) **246** may be outlets for the passageway **226** of the pin **204**. For example, the pin **204** may include one or more apertures in the outer surface **230** of the body **208** defining the one or more outlets **246** for the passageway **226**.

(29) The outlet(s) **246** may facilitate a passage of grease or lubricant from the bottom surface **228** to the outer surface **230** via the passageway **226**. In some examples, the pin **204** may include a single outlet **246**. In other examples, the pin **204** may include multiple outlets **246**. For example,



the pin **204** may include a single passageway **226** with multiple branches, each branch leading to an outlet **246** in the outer surface **230** of the body **208**. The pin **204** may include a top surface **252**. As shown in FIG. **3**, the top surface **252** may be sealed. As a result, when grease or other lubricant passes through the passageway **226**, the grease or other lubricant must exit via the outlet(s) **246**. Therefore, the passageway **226** and/or the outlet(s) **246** may facilitate a distribution of grease or other lubricant to the outer surface **230**. In other words, the passageway **226** facilitates lubricant being supplied to the second interface **232** between the outer surface **230** of the pin **204** and an inner surface of the aperture **162** of the moldboard **134**.

(30) The pin **204** may include a head portion **248**. The head portion **248** may also be referred to herein as a collar. The head portion **248** may be disposed at an opposite end of the pin **204** from the bottom portion **236**. The head portion **248** may have a cross-sectional area that is larger than the cross-sectional area of the body **208**. In some examples, the head portion **248** may include an aperture **250**. The aperture **250** may be configured to receive a retaining bolt or other member that facilitates the coupling of the linkage assembly **140** with the moldboard **134**. For example, a retaining bolt or other member may be placed within the aperture **250** to restrict a movement of the pin **204**, such as in a direction parallel to the rotational axis **202** (e.g., by coming into contact with the surface **136** of the moldboard **134**). For example, a retaining bolt may be disposed through the aperture **250** and the retaining bolt and/or the head portion **248** may be in contact with the curved surface of the moldboard **134** (e.g., the surface **136**). In some other examples, the movement of the pin **204** may be restricted via other means, such as via only the head portion **248** coming into contact with the surface **136** of the moldboard **134** (e.g., and no retaining bolt may be included in the coupling system **200**).

(31) As indicated above, FIG. **3** is provided as an example. Other examples may differ from what is described with regard to FIG. **3**.

(32) Industrial Applicability

(33) A motor grader **100** may use a snow wing to displace, move, distribute, and/or grade snow and/or other material. The snow wing may need to be moved to various positions relative to a work surface and/or the motor grader **100** to effectively carry out one or more of the functions described above and/or to enable other operations of the motor grader **100**. For example, the snow wing may be mounted on a side of an operator cab **122** of the motor grader **100** and may need to be moved to various positions to enable the motor grader **100** to operate without using the snow wing and/or to enable an operator to enter or exit the operator cab **122**.

(34) To enable the snow wing to be moved to various positions, the snow wing may be rotatably coupled to the motor grader **100**. For example, the snow wing may be rotatably mounted to a hinge to enable the snow wing to rotate in a first rotational direction. The hinge may be rotatably mounted to another assembly of the grader machine to enable the snow wing to rotate in a second rotational direction. To facilitate the coupling of the snow wing (e.g., a moldboard **134** of the snow wing) to the hinge, a coupling assembly may be used. The coupling assembly may include a pin that is passed through the moldboard and the hinge to rotatably couple the moldboard with the hinge (e.g., via a nut, such as a castle nut). However, such hinges and/or coupling assemblies do not provide any means for providing grease or lubricant to interfaces associated with the coupling assembly. Over time, the coupling assembly and/or pin may become susceptible to seizure within the components (e.g., the moldboard **134** and/or the hinge **206**) via which they contact (e.g., due to the harshness of conditions in which the motor grader **100** operates). Moreover, because there are multiple interfaces between moving components of the coupling assembly, a likelihood of seizure of a component may be increased.

(35) The coupling system **200** and/or hinge **206** described herein enables a greaseable hinge for the snow wing assembly **132** of the motor grader **100**. For example, the one or more passageways **218** and/or **226** may enable grease or other lubricant to be provided to the interface(s) (e.g., the first interface **220** and/or the second interface **232**) of the coupling system **200**. For example, if the pin

**204**, the hinge **206**, and/or the moldboard **134** were rotatably coupled together as described herein with no grease or lubricant therebetween, surfaces of these parts disposed in mutual contact with each other may rub against each other generating friction and heat, thus potentially causing one or more of the parts to seize relative to the other. The one or more passageways **218** and/or **226** may enable a volume of grease or lubricant to be effectively transferred to the first interface **220** and/or the second interface **232**. For example, a conduit or a hose (not shown) carrying a grease or a lubricant may be fluidly coupled to the fitting **224** or the inlet **234** during servicing and repairs and the grease or lubricant may be introduced into the passageway **218** and/or the passageway **226**. The grease or lubricant once introduced into the passageway **218** and/or the passageway **226** may further be forced into the first interface **220** and/or the second interface **232** via the outlet(s) **242** and/or the outlet(s) **246**. Such transfer of grease or lubricant enables the parts of the coupling system **200** to bear against the (respective) surfaces defining the first interface **220** and/or the second interface **232**, thereby increasing wear resistance and mitigating occurrence of premature wear of the parts of the coupling system **200**. Moreover, the introduction of grease or lubricant into the first interface **220** and/or the second interface **232** may reduce a likelihood that one or more of the part of the coupling system **200** will seize due to the rotational movement of the parts.

(36) The foregoing disclosure provides illustration and description, but is not intended to be exhaustive or to limit the implementations to the precise forms disclosed. Modifications and variations may be made in light of the above disclosure or may be acquired from practice of the implementations. Furthermore, any of the implementations described herein may be combined unless the foregoing disclosure expressly provides a reason that one or more implementations cannot be combined. Even though particular combinations of features are recited in the claims and/or disclosed in the specification, these combinations are not intended to limit the disclosure of various implementations. Although each dependent claim listed below may directly depend on only one claim, the disclosure of various implementations includes each dependent claim in combination with every other claim in the claim set.

(37) As used herein, “a,” “an,” and a “set” are intended to include one or more items, and may be used interchangeably with “one or more.” Further, as used herein, the article “the” is intended to include one or more items referenced in connection with the article “the” and may be used interchangeably with “the one or more.” Further, the phrase “based on” is intended to mean “based, at least in part, on” unless explicitly stated otherwise. Also, as used herein, the term “or” is intended to be inclusive when used in a series and may be used interchangeably with “and/or,” unless explicitly stated otherwise (e.g., if used in combination with “either” or “only one of”). Further, spatially relative terms, such as “below,” “lower,” “above,” “upper,” and the like, may be used herein for ease of description to describe one element or feature's relationship to another element(s) or feature(s) as illustrated in the figures. The spatially relative terms are intended to encompass different orientations of the apparatus, device, and/or element in use or operation in addition to the orientation depicted in the figures. The apparatus may be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein may likewise be interpreted accordingly.

## Claims

1. A hinge for a rotatably coupling a linkage assembly of a motor grader with a moldboard of a snow wing assembly of the motor grader, the hinge comprising: a first plate configured to mate with a second plate of the moldboard, the first plate including a first grease passageway to enable grease to pass from a first surface of the first plate to a second surface of the first plate, wherein the second surface of the first plate is configured to mate with the second plate of the moldboard; and a pin having a cylindrical body, that defines a rotational axis, extending approximately perpendicular with respect to the second surface of the first plate, wherein the pin passes through the first plate

and the second plate to rotatably couple the linkage assembly to the snow wing assembly to enable the moldboard to rotate with respect to the rotational axis, and wherein the cylindrical body includes a second grease passageway to enable grease to pass from a bottom surface of the cylindrical body to an outer surface of the cylindrical body, wherein the bottom surface of the cylindrical body is in contact with the first surface of the first plate and has a first cross-sectional area larger than a second cross-sectional area of the cylindrical body.

2. The hinge of claim 1, wherein the second surface of the first plate includes one or more channels, and wherein the first grease passageway includes one or more openings in the second surface proximate to the one or more channels to provide grease to the one or more channels.

3. The hinge of claim 2, wherein the one or more channels include a circular channel extending into the first plate about the rotational axis.

4. The hinge of claim 1, wherein the first surface of the first plate includes a grease fitting disposed at an inlet of the first grease passageway to facilitate the grease to be received within the first grease passageway.

5. The hinge of claim 1, wherein the bottom surface of the cylindrical body of the pin is disposed proximate to the first surface of the first plate, wherein the bottom surface of the cylindrical body includes an inlet for the second grease passageway, and wherein the outer surface of the cylindrical body includes one or more outlets for the second grease passageway.

6. The hinge of claim 1, wherein the pin includes a head portion comprising an aperture configured to receive a retaining bolt that facilitates a coupling of the linkage assembly with the moldboard.

7. The hinge of claim 1, wherein the hinge is moveably connected to the linkage assembly to enable the hinge to move relative to the linkage assembly in a direction that is substantially perpendicular to the rotational axis.

8. A coupling system for rotatably coupling a moldboard of a snow wing assembly, comprising: the moldboard having a curved surface and a first plate disposed on a backside of the curved surface; a linkage assembly for attaching the snow wing assembly to a motor grader, the linkage assembly configured to raise or lower the moldboard; a hinge for rotatably coupling the moldboard to the linkage assembly to enable the moldboard to rotate in a first rotational direction, the hinge including a second plate having a first face and a second face, wherein the second plate is configured to mate with the first plate of the moldboard; and wherein the second plate includes a first passageway extending between the first face and the second face to facilitate lubricant being supplied to a first interface between the first plate and the second plate; and a pin extending through the moldboard, the first plate, and the second plate at a distance away from the first passageway to rotatably couple the moldboard with the hinge, wherein the pin enables the moldboard to rotate in a second rotational direction about a rotational axis defined by a body of the pin, and wherein the body of the pin includes a second passageway extending from a bottom portion of the pin to an outer surface of the pin.

9. The coupling system of claim 8, wherein the moldboard includes an aperture configured to rotatably receive the pin, and wherein the second passageway facilitates lubricant being supplied to a second interface between the outer surface of the pin and an inner surface of the aperture.

10. The coupling system of claim 8, wherein the first interface is defined by a surface of the first plate and the second face of the second plate, and wherein the second face includes one or more grooves extending into the second plate to facilitate a distribution of the lubricant in the first interface.

11. The coupling system of claim 10, wherein the first passageway includes one or more openings in the second face disposed at the one or more grooves.

12. The coupling system of claim 8, wherein the hinge includes a lubricant fitting disposed on the first face of the second plate, wherein the lubricant fitting is disposed at an inlet of the first passageway to facilitate a supply of the lubricant to the first passageway.

13. The coupling system of claim 8, wherein the body of the pin has a substantially cylindrical

- configuration, a first aperture in a surface of the bottom portion of the pin defining an inlet for the second passageway, and one or more second apertures in the outer surface of the body of the pin defining one or more outlets for the second passageway.
14. The coupling system of claim 8, wherein the pin includes a collar disposed at an opposite end of the pin from the bottom portion, the collar having a first cross-sectional area that is larger than a second cross-sectional area of the body and an aperture; and wherein the coupling system further includes a retaining bolt disposed through the aperture, wherein at least one of the retaining bolt or the collar are in contact with the curved surface of the moldboard.
15. The coupling system of claim 8, wherein the bottom portion has a first cross-sectional area that is larger than a second cross-sectional area of the body, and wherein the bottom portion is configured to contact the first face of the second plate to restrict a movement of the pin.
16. A motor grader, comprising: a snow wing assembly including a moldboard, the moldboard including a curved surface, a first plate disposed proximate to a backside of the curved surface, and an aperture; a linkage assembly configured to link the snow wing assembly to an undercarriage assembly of the motor grader; a hinge for rotatably coupling the moldboard to the linkage assembly, the hinge including a second plate having a first face and a second face, wherein the second face of the second plate is configured to mate with a surface of the first plate of the moldboard, and wherein the second plate includes a first grease passageway extending between the first face and the second face of the second plate to facilitate grease being supplied to a first interface between the first plate and the second plate; and a pin extending through the aperture of the moldboard, the first plate, and the second plate at a distance away from the first grease passageway to rotatably couple the moldboard with the hinge, wherein the pin enables the moldboard to rotate in a first rotational direction about a rotational axis defined by a cylindrical body of the pin.
17. The motor grader of claim 16, wherein the pin includes a second grease passageway extending from a bottom portion of the pin to an outer surface of the pin to facilitate grease being supplied to a second interface between the outer surface of the pin and a surface of the aperture.
18. The motor grader of claim 16, wherein the second face of the second plate includes one or more grooves configured to distribute grease to an interface between the first plate and the second plate.
19. The motor grader of claim 16, wherein the pin includes one or more outlets for the first grease passageway disposed on an outer surface of the pin.
20. The motor grader of claim 16, wherein the moldboard has a rectangular configuration; and wherein the aperture is located proximate to one of a short edge of the rectangular configuration.
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