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(54) **ELECTRONIC VEHICLE WIPER BLADE PARKING MECHANISM**

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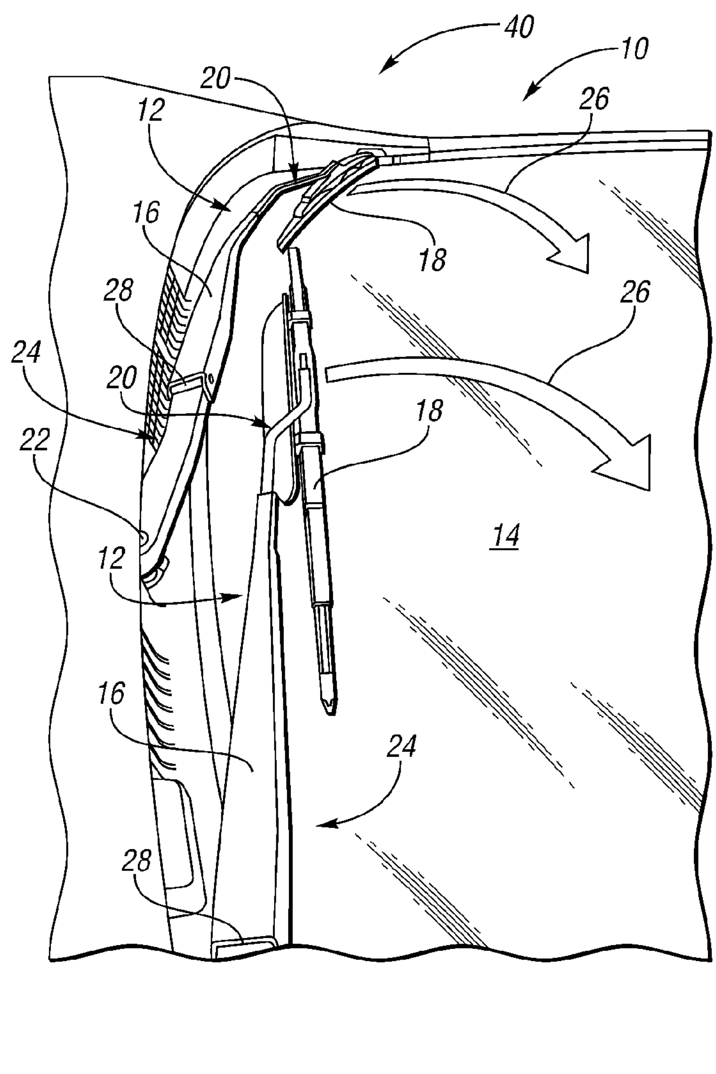
(57) **ABSTRACT**

A vehicle wiper assembly includes a wiper blade configured to wipe a surface, an armature, and an actuator. The armature has a first end spaced from a second end, and is coupled with the wiper blade at the first end, and coupled to a pivot mechanism at the second end. The pivot mechanism is configured to allow the wiper blade to articulate about the second end in a direction substantially away from the surface and between a wiping position and a parked position. The actuator is provided in mechanical communication with the armature and is configured to receive an electrical actuation signal to transition the wiper blade between a wiping position and the parked position, where the wiper blade is in contact with the surface while in the wiping position, and is separated from the surface while in the parked position.



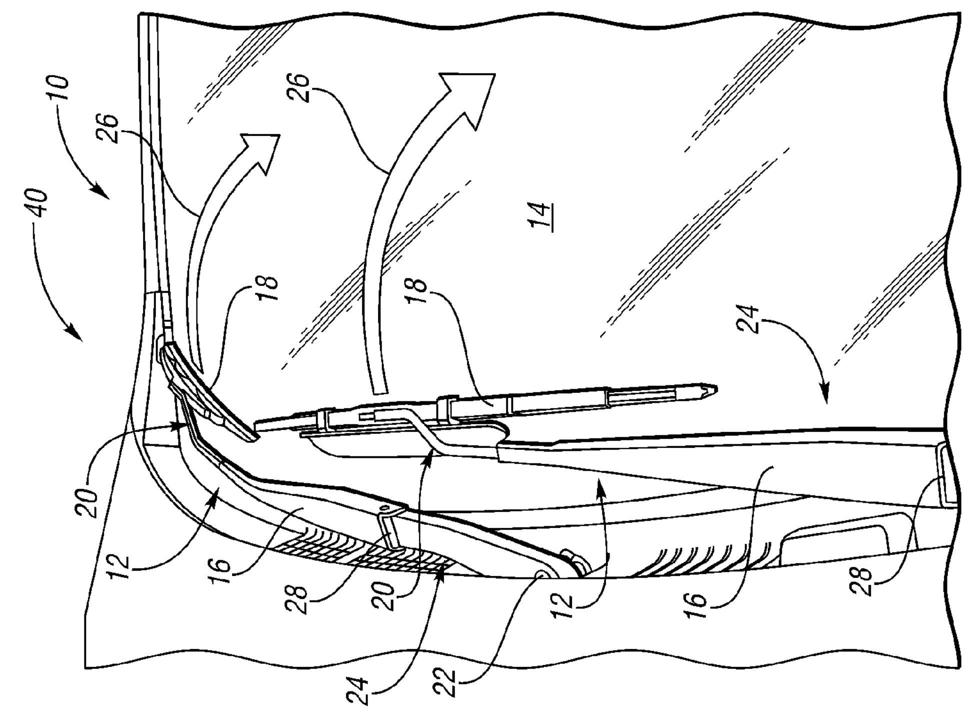

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FIG. 1

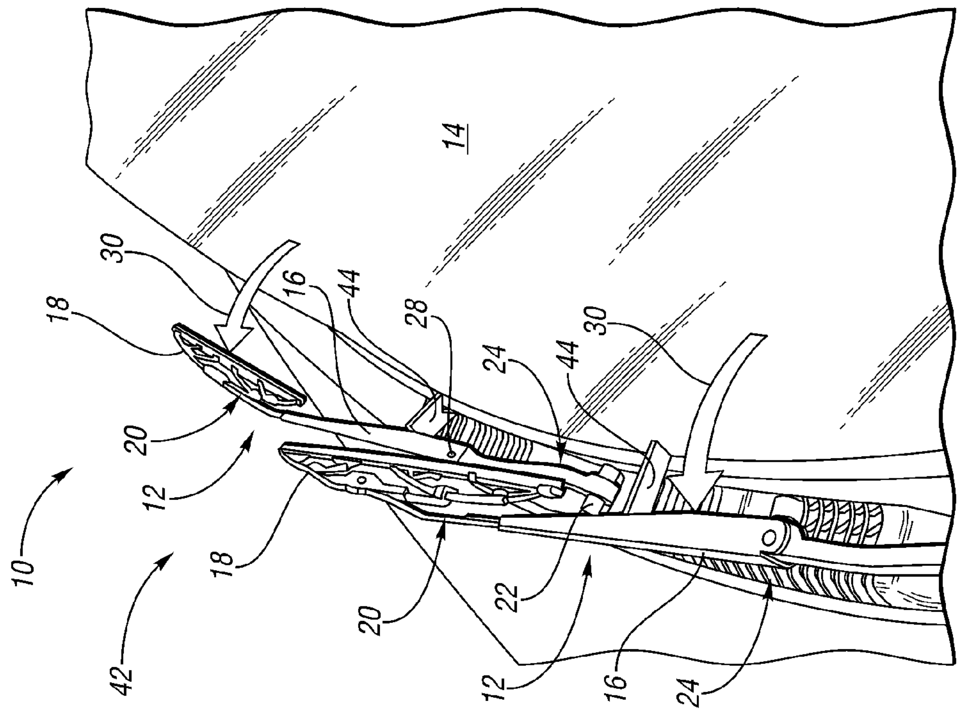
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FIG. 2

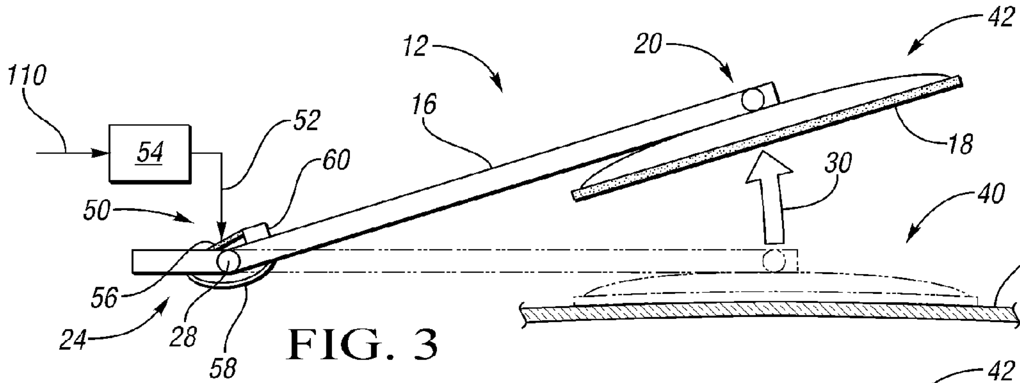

FIG. 3

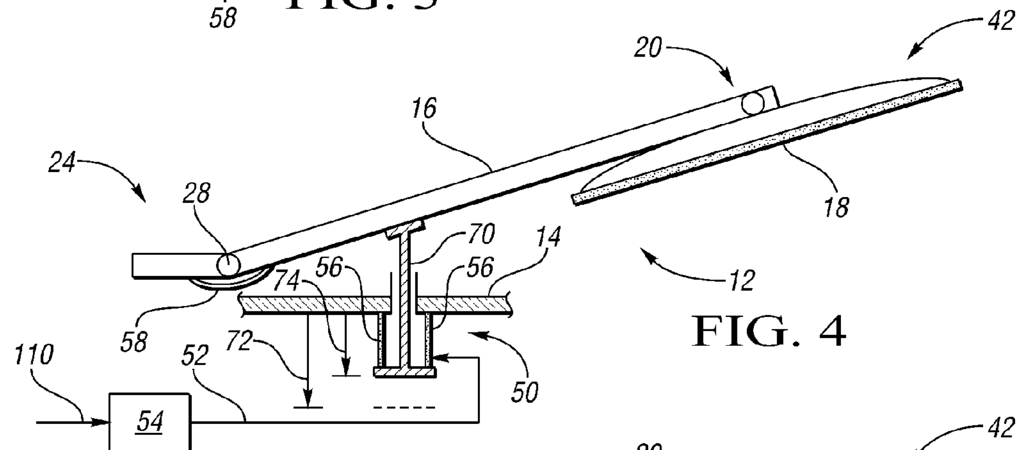

FIG. 4

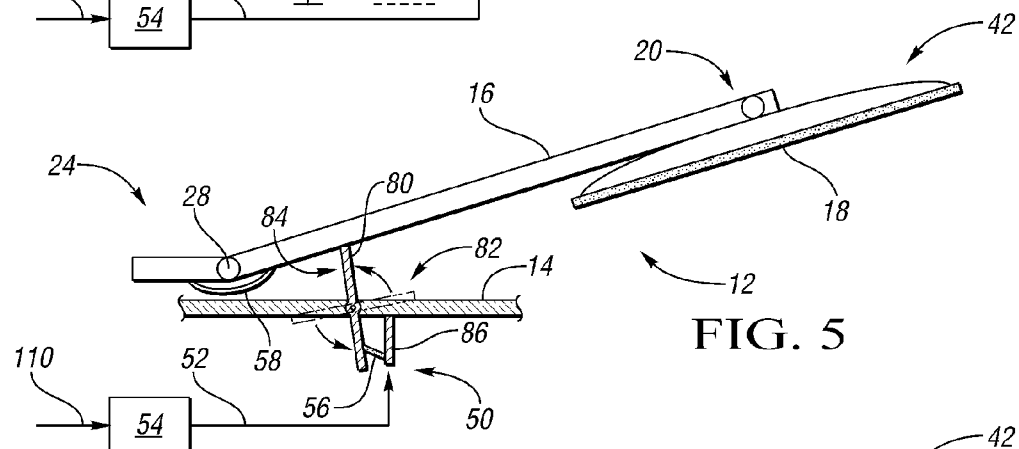

FIG. 5

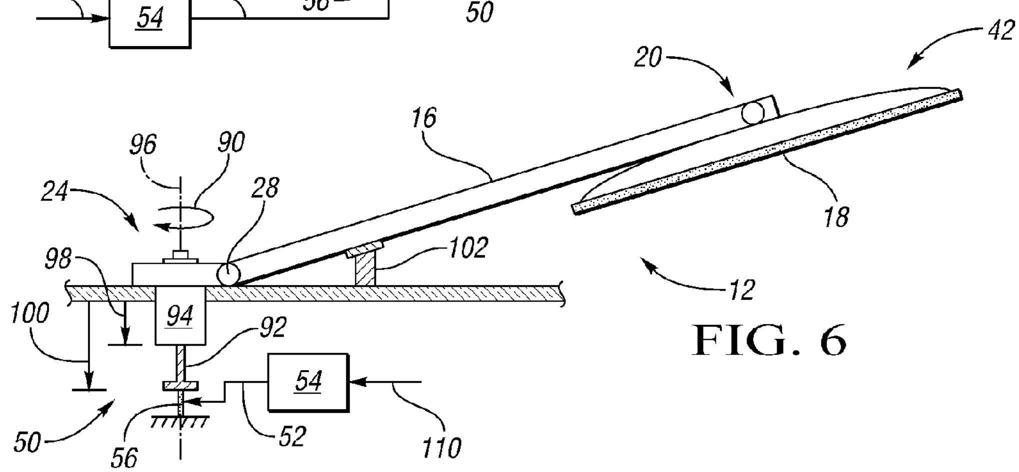

FIG. 6

ELECTRONIC VEHICLE WIPER BLADE PARKING MECHANISM

TECHNICAL FIELD

[0001] The present invention relates to vehicle wiper blade assemblies.

BACKGROUND

[0002] A vehicle wiper assembly is a device used to remove liquid, such as rain, and/or debris from the surface of a vehicle window. Often wiper assemblies are used in conjunction with the front windshield/windscreen of the vehicle and/or a rear window of the vehicle. Vehicles that may employ the use of wiper assemblies may include, for example, automobiles, trains, aircrafts and watercrafts.

[0003] A wiper assembly may generally include a long wiper blade that is swung back and forth over the surface of the glass to push water from its surface. The speed is normally adjustable, with several continuous speeds and often one or more "intermittent" settings. Also, the blade may be adapted to conform to any varying curvature that may be present along the surface of the window.

[0004] During inclement weather, especially in colder climates, rain or melted snow may accumulate on the wiper blade, where it may freeze to ice. Accumulated ice may detract from the blade's ability to conform to a varying surface curvature or wiping ability. Additionally, the wiper blade may freeze to the surface of the window if left in stationary contact with the surface during, for example, a snow storm. Removing the blade from its frozen condition may tend to cause damage to the blade, which may result in reduced wiping performance.

SUMMARY

[0005] A vehicle wiper assembly includes a wiper blade configured to wipe a surface, an armature, and an actuator. The armature has a first end spaced from a second end, and is coupled with the wiper blade at the first end, and coupled to a pivot mechanism at the second end. The pivot mechanism is configured to allow the wiper blade to articulate about the second end in a direction substantially away from the surface and between a wiping position and a parked position. The actuator is provided in mechanical communication with the armature and is configured to receive an electrical actuation signal that transitions the wiper blade between a wiping position and the parked position, wherein the wiper blade is in contact with the surface while in the wiping position, and is separated from the surface while in the parked position.

[0006] In an embodiment, the actuator may include a shape memory alloy material having a crystallographic phase that is changeable between austenite and martensite in response to the electrical actuation signal. For example, the shape memory alloy material may be formed into a wire that has a length, where the wire is configured to contract in length in response to the electrical actuation signal. The wire may be in mechanical communication with the armature, and the contraction of the length of the wire may be configured to urge the armature to articulate about the second end.

[0007] In one configuration, the actuator may include an extendable riser disposed between the armature and the surface, wherein the riser has a height that is transitionable between a nominal position and an extended position in response to the electrical actuation signal. As such, the extendable riser may be operative to lift a portion of the armature when transitioned to the extended position.

[0008] In another configuration, the actuator may include an articulating stand disposed between the armature and the surface. The stand may be configured to articulate between a collapsed position and a standing position in response to the electrical actuation signal, where it is operative to lift a portion of the armature when articulated to the standing position.

[0009] In yet another configuration, the vehicle wiper assembly may further include a rotary hub coupled to the second end of the armature. The rotary hub may have an axis of rotation and be configured to articulate the wiper blade about the second end and in a direction substantially along the surface. The actuator may include the rotary hub, where the rotary hub is additionally configured to translate along the axis of rotation to transition the wiper blade between the wiping position and the parked position.

[0010] The vehicle wiper assembly may include a controller that is configured to provide the electrical actuation signal to the actuator in response to a key-off event or a user event. Additionally, the pivot mechanism may include a locking mechanism that is configured to selectively maintain the wiper blade in the parked position.

[0011] The above features and advantages and other features and advantages of the present invention are readily apparent from the following detailed description of the best modes for carrying out the invention when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. **1** is a perspective illustration of a vehicle wiper assembly disposed in a wiping position in contact with a surface.

[0013] FIG. **2** is a perspective illustration of a vehicle wiper assembly disposed in a parked position separate from the surface.

[0014] FIG. **3** is a schematic side view of an embodiment of a vehicle wiper assembly including a tendon-type actuator.

[0015] FIG. **4** is a schematic side view of an embodiment of a vehicle wiper assembly including a selectively extendable riser.

[0016] FIG. **5** is a schematic side view of an embodiment of a vehicle wiper assembly including a selectively articulating stand.

[0017] FIG. **6** is a schematic side view of an embodiment of a vehicle wiper assembly including a selectively translatable rotary hub.

DETAILED DESCRIPTION

[0018] Referring to the drawings, wherein like reference numerals are used to identify like or identical components in the various views, FIG. **1** schematically illustrates a vehicle **10** having a pair of wiper assemblies **12** configured to wipe a liquid across the surface **14** of a window.

[0019] Each wiper assembly **12** may include an armature **16** that may be coupled to a wiper blade **18** at a first end **20** and coupled to a rotary hub **22** at a second end **24**. The rotary hub **22** may have an axis of rotation that is substantially normal to the surface **14**, and may be configured to articulate the wiper blade **18** along the surface **14** in an arc-shaped path **26**. Such a motion may, for example, allow the wiper blade **18** to push liquid or debris toward the perimeter of the surface **14** of the window.

[0020] The armature **16** may further include a pivot mechanism **28** coupled to the second end **24**, which may allow the armature **16** and wiper blade **18** to articulate in a direction **30** substantially away from the surface **14** as generally illustrated in FIG. **2**. Such an articulation may be generally made about the second end **24**, and may transition the wiper blade **18** between a wiping position (generally illustrated at **40** in FIG. **1**) and a parked position (generally illustrated at **42** in FIG. **2**). The pivot mechanism **28** may additionally be configured to selectively hold and/or maintain the wiper blade **18** in either the parked **42** or wiping **40** position, such as through the use of detents, latches, or other similar holding/locking means. For example, a spring may be used to hold the wiper blade **18** in the wiping position **40**. While in the wiping position **40**, the wiper blade **18** may generally be in contact with the surface **14** along its entire length. Thus, motion along the arc-shaped path **26** while the wiper blade **18** is in the wiping position **40** may be effective to clear liquid or debris from the surface **14**. Conversely, while the wiper blade **18** is in the parked position **42**, the wiper blade **18** may be substantially separated, or positioned apart from the surface **14**. As further illustrated in FIG. **2**, to lift and/or maintain the armature **16** and wiper blade **18** in the parked position, a stand **44** may extend between the surface **14** and the armature **16**.

[0021] When parking the vehicle in cold, wet weather conditions, separating the wiper blade **18** from the surface **14** (i.e., in the parked position **42**), may prevent the blade **18** from freezing to the surface **14**. Similarly, when in hot weather conditions, the parked position **42** may prevent the blade **18** from permanently deforming against the surface **14** such as when the blade **18** may be softened from the heat.

[0022] As generally illustrated in FIGS. **3**-**6**, an actuator **50** may be in mechanical communication with the armature **16**, and may be configured to transition the wiper blade **18** between the wiping position **40** and the parked position **42**. The actuator **50** may be configured to receive an electrical actuation signal **52** from a controller **54**, and transition the wiper blade **18** in response to the signal **52**. While the actuator **50** may take various forms, in one configuration, it may include a shape memory alloy material **56** with a crystallographic phase that is changeable between austenite and martensite in response to the electrical actuation signal **52**.

[0023] As used herein, the terminology "shape memory alloy" (often abbreviated as "SMA") refers to alloys which exhibit a shape memory effect. That is, the shape memory alloy material **56** may undergo a solid state, crystallographic phase change to shift between a martensite phase, i.e., "martensite", and an austenite phase, i.e., "austenite." Alternatively stated, the shape memory alloy material **56** may undergo a displacive transformation rather than a diffusional transformation to shift between martensite and austenite. A displacive transformation is a structural change that occurs by the coordinated movement of atoms (or groups of atoms) relative to their neighbors. In general, the martensite phase refers to the comparatively lower-temperature phase and is often more deformable than the comparatively higher-temperature austenite phase.

[0024] The temperature at which the shape memory alloy material **56** begins to change from the austenite phase to the martensite phase is known as the martensite start temperature, M_s. The temperature at which the shape memory alloy material **56** completes the change from the austenite phase to the martensite phase is known as the martensite finish temperature, M_f. Similarly, as the shape memory alloy material **56** is heated, the temperature at which the shape memory alloy material **56** begins to change from the martensite phase to the austenite phase is known as the austenite start temperature, A_s. The temperature at which the shape memory alloy material **56** completes the change from the martensite phase to the austenite phase is known as the austenite finish temperature, A_f.

[0025] Therefore, the shape memory alloy material **56** may be characterized by a cold state, i.e., when a temperature of the shape memory alloy material **56** is below the martensite finish temperature M_f of the shape memory alloy material **56**. Likewise, the shape memory alloy material **56** may also be characterized by a hot state, i.e., when the temperature of the shape memory alloy material **56** is above the austenite finish temperature A_f of the shape memory alloy material **56**.

[0026] In operation, shape memory alloy material **56** that is pre-strained or subjected to tensile stress can change dimension upon changing crystallographic phase to thereby convert thermal energy to mechanical energy. That is, the shape memory alloy material **56** may change crystallographic phase from martensite to austenite and thereby dimensionally contract if pseudoplastically pre-strained so as to convert thermal energy to mechanical energy. Conversely, the shape memory alloy material **56** may change crystallographic phase from austenite to martensite and if under stress thereby dimensionally expand so as to also convert thermal energy to mechanical energy.

[0027] Pseudoplastically pre-strained refers to stretching of the shape memory alloy material **56** while in the martensite phase so that the strain exhibited by the shape memory alloy material **56** under that loading condition is not fully recovered when unloaded, where purely elastic strain would be fully recovered. In the case of the shape memory alloy material **56**, it is possible to load the material such that the elastic strain limit is surpassed and deformation takes place in the martensitic crystal structure of the material prior to exceeding the true plastic strain limit of the material. Strain of this type, between those two limits, is pseudoplastic strain, called such because upon unloading it appears to have plastically deformed. However, when heated to the point that the shape memory alloy material **56** transforms to its austenite phase, that strain can be recovered, returning the shape memory alloy material **56** to the original length observed prior to application of the load.

[0028] The shape memory alloy material **56** may be stretched before installation into the actuator **50**, such that a nominal length of the shape memory alloy material **56** includes recoverable pseudoplastic strain. Alternating between the pseudoplastic deformation state (relatively long length) and the fully-recovered austenite phase (relatively short length) may apply a force that may be used to lift the wiper blade **18**.

[0029] The shape memory alloy material **56** may change both modulus and dimension upon changing crystallographic phase to thereby convert thermal energy to mechanical energy. More specifically, the shape memory alloy material **56**, if pseudoplastically pre-strained, may dimensionally contract upon changing crystallographic phase from martensite to austenite and may dimensionally expand, if under tensile stress, upon changing crystallographic phase from austenite to martensite to thereby convert thermal energy to mechanical energy. Therefore, if the shape memory alloy material **56** is resistively heated via an electrical actuation signal **52**, it may dimensionally contract upon changing crystallographic phase between martensite and austenite.

[0030] The shape memory alloy material **56** may have any suitable composition. In particular, the shape memory alloy material **56** may include an element selected from the group including, without limitation: cobalt, nickel, titanium, indium, manganese, iron, palladium, zinc, copper, silver, gold, cadmium, tin, silicon, platinum, gallium, and combinations thereof. For example, and without limitation, suitable shape memory alloys **56** may include nickel-titanium based alloys, nickel-aluminum based alloys, nickel-gallium based alloys, indium-titanium based alloys, indium-cadmium based alloys, nickel-cobalt-aluminum based alloys, nickel-manganese-gallium based alloys, copper based alloys (e.g., copper-zinc alloys, copper-aluminum alloys, copper-gold alloys, and copper-tin alloys), gold-cadmium based alloys, silver-cadmium based alloys, manganese-copper based alloys, iron-platinum based alloys, iron-palladium based alloys, and combinations thereof.

[0031] The shape memory alloy material **56** can be binary, ternary, or any higher order so long as the shape memory alloy material **56** exhibits a shape memory effect, i.e., a change in shape orientation, damping capacity, and the like. The specific shape memory alloy material **56** may be selected according to expected operating temperatures that the wiper assembly **12** will be used with. In one specific example, the shape memory alloy material **56** may include nickel and titanium.

[0032] In other embodiments, the actuator **50** may include motors, solenoids, or other actuation means that may be responsive to an electrical actuation signal **52**. While FIGS. **3-6** illustrate various types of actuators, these embodiments should be regarded as illustrative rather than exclusive. As may be appreciated, the shape memory alloy material **56** may be suitably replaced with other linear actuation means. Alternatively, the pivot mechanism **28** may be directly coupled to and/or include various direct drive motors, geared motors, or other similar drive mechanisms.

[0033] In an embodiment, the wiper assembly **12** may further include a return mechanism **58** that may be configured to transition the blade **18** from the parked position **42** to the wiping position **40**. The return mechanism **58** may include, for example, a spring or an actuator that may apply a force to the armature **16** in such a manner to rotate the armature **16** and wiper blade **18** about the pivot mechanism **28** in a direction toward the surface **14**. In one configuration, the return mechanism **58** may be configured to provide a gradual return force to controllably return the assembly **12** to the wiping position **40**. In another configuration, the return mechanism **58** may apply a strong enough force for debris or ice to be knocked loose of the wiper blade **18** when the blade **18** strikes the surface **14**. As such, the parking mechanism may be used as a de-icing apparatus.

[0034] Referring specifically to FIG. **3**, a wiper assembly **12** is schematically illustrated, where the wiper assembly **12** includes a wiper blade **18** coupled with a first end **20** of an armature **16**. The armature **16** may further include a pivot mechanism **28** coupled at the second end **24**. FIG. **3** illustrates the wiper assembly **12** disposed in a parked position **42**, though having been transitioned in a direction **30** substantially away from the surface **14**, from a wiping position **40**.

[0035] As schematically illustrated in FIG. **3** the actuator **50** may include a shape memory alloy material **56** that is disposed across the pivot mechanism **28** in a tendon-like arrangement. In one configuration, the shape memory alloy material **56** may be coupled to a riser **60** that may extend from the armature to enhance the mechanical leverage of the actuator **50**. In another embodiment, a second riser may similarly be disposed on the opposing side of the pivot mechanism **28** to further increase the mechanical leverage of the actuator **50**.

[0036] The shape memory alloy material **56** may be formed as a wire, which has a length configured to contract in response to an electrical actuation signal **52**. In one configuration, the electrical actuation signal **52** may be provided by a controller **54** that may be in electrical communication with the actuator **50**. As such, the wire may be pseudoplastically pre-stretched while in a martensite phase, with the wiper assembly **12** in a wiping position **40**. Upon receipt of the electrical actuation signal **52**, the phase of the shape memory alloy material **56** may change to austenite, wherein the pseudoplastic strain may be recovered. The reduction in the length of the shape memory alloy material **56** may correspondingly urge the armature **16** to articulate about the second end **24** (i.e., the pivot mechanism **28**). As may be appreciated, the articulation of the armature **16** may transition the wiper blade **18** between the wiping position **40** in contact with the surface **14**, and the parked position **42** separate from the surface **14**.

[0037] FIG. **4** is a schematic illustration of a wiper assembly **12** that includes an actuator **50** configured to lift a portion of the armature **16**. As shown, the actuator **50** may be disposed between the surface **14** and the armature **16**, and may include an extendable riser **70** adapted to mechanically engage and apply a lifting force to the armature **16**. In one configuration, the riser **70** may selectively transition between a nominal position **72** and an extended position **74**. In the nominal position **72**, for example, the riser **70** may be generally situated apart from the armature **16** and/or in a configuration where the riser **70** applies substantially no upward lifting force to the armature **16**. In the extended position **74**, the riser **70** may extend upward from the surface **14** to such a degree where it may hold the armature **16** and wiper blade **18** in a parked position **42**.

[0038] The actuator **50** may be configured to transition between the nominal position **72** and the extended position **74** in response to an electrical actuation signal **52**, such as one provided by a controller **54**. During the transition, the riser **70** may mechanically engage the armature **16**, and may further urge it to articulate away from the surface **14** and about the second end **24**. In one embodiment, the actuator **50** may include, for example, one or more actuator elements that may each comprise a respective shape memory alloy material **56**. In another embodiment, the actuator **50** may include one or more other linear-type actuators, such as, for example, solenoids, rack and pinion mechanisms, linear screws, electrically controlled pneumatics or hydraulics, or other similarly situated actuators.

[0039] As schematically illustrated, the shape memory alloy material **56** may be disposed between the riser **70** and the surface **14**. In such an embodiment, the shape memory alloy material **56** may be pseudoplastically pre-strained and configured to contract in length when transitioned into an austenite phase (e.g., when it is resistively heated by the electrical actuation signal **52**). As may be appreciated, other similar configurations may be employed to enable the riser **70** to extend from the surface **14** in response to the electrical actuation signal **52**.

[0040] FIG. **5** schematically illustrates an embodiment of a windshield wiper assembly **12**, where the actuator **50**

includes an articulating stand **80** disposed between the armature **16** and the surface **14**. The stand **80** may be configured to articulate between a collapsed position **82** (i.e., substantially parallel with the surface), and a standing position **84**, where the stand **80** may be operative to lift a portion of the armature **16** when articulated to the standing position **84** (as shown). The stand **80** may transition between the collapsed position **82** and the standing position **84** in response to an electrical actuation signal **52** that may be provided from a controller **54**.

[0041] In one configuration, the actuator **50** may include a shape memory alloy material **56** that may be coupled between, for example, a riser **86** and the articulating stand **80**. The shape memory alloy material **56** may be pseudoplastically pre-strained while in the collapsed position **82**, however, may recover that strain and contract in length when transitioned to an austenite phase (e.g., through resistive heating). In other configurations, other rotary or linear actuators may be used to transition the stand **80** between the collapsed position **82** and the standing position **84**. For example, a motor may be coupled to the central hub of the articulating stand **80**, either directly, or through one or more gears, belts, or pulleys, to selectively articulate the state **80**. When transitioned to a standing position **84**, the stand **80** may mechanically contact the armature **16**, and urge it to pivot away from the surface **14**.

[0042] While FIGS. **4** and **5** schematically illustrate the actuator **50** positioned on the surface **14** and configured to extend up to the armature **16**, it is equally possible to position the actuator **50** on the armature **16**, where it would be configured to extend down to contact the surface **14** and apply the lifting force.

[0043] FIG. **6** schematically illustrates an embodiment of a wiper assembly **12** that integrates the actuator **50** with the rotary hub **22** that may articulate the wiper blade **18** along the surface **14** in an arc-shaped path **26** (as generally described above with reference to FIG. **1**). As schematically illustrated, the rotary hub **22** may be configured to impart a rotary motion **90** to a drive axle **92** which may be directly joined to the armature **16**. The drive axle **92** may be disposed within a drive means **94** that is configured to impart the rotary motion **90** to the axle **92** about an axis of rotation **96**. In one embodiment, the drive axle **92** may be a rotor disposed within a stator. In other embodiments, however, various cam mechanisms and/or linkages may alternatively or additionally be employed as the drive means **94** to articulate the drive axle **92**.

[0044] As generally provided in FIG. **6**, the drive axle **92** may be configured to translate within the drive means **94** and along the axis of rotation **96**. This translation may generally be made between a first position **98** and a second position **100**. As the drive axle **92** translates, it may be rigidly coupled with the armature **16** such that the armature **16** will correspondingly translate along the axis of rotation **96**, which may be normal to the surface **14**. A downward/inward translation of the armature **16** relative to the surface may then cause the armature **16** to pivot about a riser **102**, which may extend from the surface **14**. Similarly, the actuation may cause a corresponding pivot motion about the pivot mechanism **28**.

[0045] The translation of the drive axle **92** may be caused by the actuator **50**, which may include, for example, a shape memory alloy material **56** responsive to an electrical actuation signal **52** provided by a controller **54**. In other configurations, the actuator **50** may include other types of liner actuators, including, for example, solenoids, rack and pinion mechanisms, linear screws, electrically controlled pneumatics or hydraulics, or other similarly situated actuators. As may be appreciated, translation of the drive axle **92**, and the corresponding pivoting motion, may be operative to transition the wiper blade between the wiping position (not shown) and the parked position **42**.

[0046] While FIGS. **3-6** are meant to be illustrative of various actuation techniques and/or mechanisms, it should be understood that the actuator **50** may employ other mechanism means to transition the wiper assembly **12** from a wiping position **40** to a parked position **42**. Such means may include the use of actuated **4** (or more)-bar linkages, a translatable wedge/ramp that provides a lifting force to the armature, or other similar mechanisms.

[0047] As generally illustrated in FIGS. **3-6**, the controller **54** may be responsive to an event signal **110**. The event signal **110** may, for example, be a signal generated by a user event, such as, for example, depressing a button, toggling a switch, or turning a dial (i.e., actuation means performed by a user/passenger of the vehicle). As such, the controller **54** may be responsive to the actuation of the button/switch/dial by the user (and to corresponding event signal **110**) to generate an electrical actuation signal **52**, which may, in turn, cause the wiper blade **18** to transition between the wiping position **40** and the parked position **42**.

[0048] In an embodiment, the event signal **110** may comprise a signal signifying a key-off event (i.e., the vehicle being transitioned to an "off" state, such as by transitioning an ignition-key to an "off" position). As such, the controller **54** may provide the electrical actuation signal **52** when the vehicle is in an "off" state. This configuration may be a more automatic actuation than relying on a user-driven event. As such, the controller **54** may be responsive to the key-off event to transition the wiper blade **18** between the wiping position **40** and the parked position **42**. In a further configuration, the controller **54** may generate the electrical actuation signal **52** when it receives an indication of both a key-off event and a temperature condition. As such, the wiper blade **18** may be automatically be transitioned to the parked position **42** when the vehicle is off, and when the temperature either falls to a point where the blade **18** is in danger of freezing to the surface **14** or increases to a point where the blade **18** is in danger of melting/deforming on the surface **14**.

[0049] While the best modes for carrying out the invention have been described in detail, particularly with respect to FIGS. **3-6**, those familiar with the art to which this invention relates will recognize that various alternative actuator designs may be employed. It is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative only and not as limiting.

1. A vehicle wiper assembly comprising:

a wiper blade configured to wipe a surface;

an armature including a first end spaced from a second end, the armature coupled with the wiper blade at the first end, and coupled to a pivot mechanism at the second end, the pivot mechanism configured to allow the wiper blade and armature to articulate about the second end in a direction substantially away from the surface and between a wiping position and a parked position; and

an actuator in mechanical communication with the armature and configured to receive an electrical actuation signal;

wherein the wiper blade is in contact with the surface while in the wiping position, and the wiper blade is separated from the surface while in the parked position; and

wherein the actuator is configured to transition the wiper blade between the wiping position and the parked position in response to the received electrical actuation signal.

2. The vehicle wiper assembly of claim **1**, wherein the actuator includes a shape memory alloy material having a crystallographic phase that is changeable between martensite and austenite in response to the electrical actuation signal.

3. The vehicle wiper assembly of claim **2**, wherein the shape memory alloy material is a wire having a length, the wire being configured to contract in length in response to the electrical actuation signal.

4. The vehicle wiper assembly of claim **3**, wherein the wire is in mechanical communication with the armature; and wherein a contraction of the length of the wire is operatively configured to transition the armature to articulate about the second end.

5. The vehicle wiper assembly of claim **1**, wherein the actuator includes an extendable riser disposed between the armature and the surface, the riser having a height that is transitionable between a nominal position and an extended position in response to the electrical actuation signal; and

wherein the extendable riser is operative to lift a portion of the armature when transitioned to the extended position.

6. The vehicle wiper assembly of claim **1**, wherein the actuator includes an articulating stand disposed between the armature and the surface, the stand configured to articulate between a collapsed position and a standing position in response to the electrical actuation signal; and

wherein the stand is operative to lift a portion of the armature when articulated to the standing position.

7. The vehicle wiper assembly of claim **1**, further comprising a rotary hub coupled to the second end of the armature, the rotary hub having an axis of rotation and configured to articulate the wiper blade about the second end and in a direction substantially along the surface.

8. The vehicle wiper assembly of claim **7**, wherein the actuator includes the rotary hub, the rotary hub being configured to translate along the axis of rotation to transition the wiper blade between the wiping position and the parked position.

9. The vehicle wiper assembly of claim **1**, further comprising a controller configured to provide the electrical actuation signal.

10. The vehicle wiper assembly of claim **1**, wherein the pivot mechanism is configured to selectively maintain the wiper blade in the parked position.

11. The vehicle wiper assembly of claim **1**, further comprising a return mechanism configured to apply a force to the armature that urges the armature to rotate about the pivot mechanism in a direction toward the surface.

12. The vehicle wiper assembly of claim **11**, wherein the force applied to the armature by the return mechanism is operative to cause the wiper blade to strike the surface.

13. A vehicle wiper assembly comprising:

a wiper blade configured to wipe a surface;

an armature including a first end spaced from a second end, the armature coupled with the wiper blade at the first end, and coupled to a pivot mechanism at the second end, the pivot mechanism configured to allow the wiper blade and armature to articulate about the second end in a direction substantially away from the surface and between a wiping position and a parked position; and

an actuator in mechanical communication with the armature and configured to receive an electrical actuation signal, the actuator including a shape memory alloy material having a crystallographic phase that is changeable between martensite and austenite in response to the electrical actuation signal;

wherein the wiper blade is in contact with the surface while in the wiping position, and the wiper blade is separated from the surface while in the parked position; and

wherein the shape memory alloy material has a length that is operatively configured to contract in response to the electrical actuation signal, and wherein the contraction in length is operatively configured to transition the wiper blade between the wiping position and the parked position.

14. The vehicle wiper assembly of claim **13**, wherein the actuator includes an extendable riser disposed between the armature and the surface, the riser having a height that is transitionable between a nominal position and an extended position in response to the contraction in length of the shape memory alloy material; and

wherein the extendable riser is operative to lift a portion of the armature when transitioned to the extended position.

15. The vehicle wiper assembly of claim **13**, wherein the actuator includes an articulating stand disposed between the armature and the surface, the stand and configured to articulate between a collapsed position and a standing position in response to the contraction in length of the shape memory alloy material; and

wherein the stand is operative to lift a portion of the armature when articulated to the standing position.

16. The vehicle wiper assembly of claim **13**, further comprising a rotary hub coupled to the second end of the armature, the rotary hub having an axis of rotation and configured to articulate the wiper blade about the second end and in a direction substantially along the surface.

17. The vehicle wiper assembly of claim **16**, wherein the actuator includes the rotary hub, the rotary hub being configured to translate along the axis of rotation in response to the contraction in length of the shape memory alloy material, the translation configured to transition the wiper blade between the wiping position and the parked position.

18. The vehicle wiper assembly of claim **13**, further comprising a controller configured to provide the electrical actuation signal in response to an event signal.

19. The vehicle wiper assembly of claim **13**, wherein the pivot mechanism includes a locking mechanism configured to selectively maintain the wiper blade in the parked position.

20. A vehicle wiper assembly comprising:

a wiper blade configured to wipe a surface;

an armature including a first end spaced from a second end, the armature coupled with the wiper blade at the first end, and coupled to a pivot mechanism at the second end, the pivot mechanism configured to allow the wiper blade and armature to articulate about the second end in a direction substantially away from the surface and between a wiping position and a parked position;

a controller configured to provide an electrical actuation signal in response to an event signal, the event signal indicative of a depressed button, a toggled switch, a turned dial, or an ignition key in an “off” position.

an actuator in mechanical communication with the armature and configured to receive the electrical actuation signal, the actuator being configured to transition the wiper blade between the wiping position and the parked position in response to the received electrical actuation signal; and

wherein the wiper blade is in contact with the surface while in the wiping position, and the wiper blade is separated from the surface while in the parked position.

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