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ADJUSTABLE SEATPOST ARRANGEMENT FOR A BICYCLE

Abstract

A seatpost assembly may generally include a lower post and an upper post movable relative to the lower post. The upper post is movable relative to the lower post between a high position and a low position. An actuation assembly is configured to receive a user input. A height change assembly is provided in conjunction with the actuation assembly. The height change assembly is operable to drive the upper post to the high position and to drive the upper post to the low position. The height change assembly may be operable responsive to receiving the user input and to drive the upper post to the low position responsive to receiving the user input.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] The present application claims the benefit of priority to U.S. Provisional Patent Application Ser. No. 63/554,847, filed on Feb. 16, 2024, the disclosure of which is incorporated by reference in its entirety.

FIELD OF THE DISCLOSURE
[0002] The present disclosure relates to an adjustable seatpost arrangement for a bicycle. Specifically, the disclosure describes a seatpost arrangement that may be adjusted by a user between a number of seating heights. For example, an adjustable seatpost arrangement may be provided to facilitate a user to adjust to a desired seating height based on conditions and while riding the bicycle.
BACKGROUND
[0003] A bicycle may generally be equipped with a seatpost arrangement. For example, a seatpost may be provided to support a seat or saddle relative to a frame of the bicycle. The seatpost arrangement may be received within a seatpost-receiving portion of the bicycle known as a seat tube. The seatpost arrangement and frame of the bicycle may be clamped in place to fix relative positions of the seatpost arrangement and the frame of the bicycle appropriate to a rider fit and bicycle geometry.
[0004] Maintaining an appropriate position of the saddle is an important task of the seatpost arrangement of a bicycle. A rider can be very sensitive to changes in saddle position. For example, while riding the bicycle on smooth, predictable terrain or when power output is of high importance (for example when climbing steep hills), a rider benefits from a saddle at a relatively high position to allow efficient power transfer and favorable pedaling biomechanics.
[0005] However, a saddle position (more particularly a saddle height) that is optimized for efficient pedaling is often not conducive to strong control of a bicycle. For example, when descending technical terrain, riding slowly, jumping, mounting, dismounting, or similar technical control situations, a relatively high saddle height limits rider movement relative to the bike. Adjustable seatpost arrangements generally allow a rider to make on-the-fly adjustments to saddle height, providing optimal pedaling efficiency and optimal bicycle control independently when each is needed.
[0006] As such, there is a need for an adjustable seatpost assembly that enables easy control between an optimal saddle height for pedaling efficiency and a saddle height that does not interfere with bicycle technical control. Such an adjustable seatpost assembly should be easy to operate between states with minimal rider input that may disrupt or distract from transitions between pedaling and technical riding.
BRIEF DESCRIPTION
[0007] An object of this disclosure is to describe various adjustable seatpost arrangements configured to control saddle heights. An adjustable seatpost arrangement may be provided to allow a user to change between desired saddle heights on command, for example with a button or a switch.
[0008] One aspect of the disclosure provides a seatpost assembly including a lower post; an upper post movable relative to the lower post between a high position and a low position; an actuation assembly configured to receive a user input; and a height change assembly operable to drive the upper post to the high position responsive to receiving the user input and to drive the upper post to the low position responsive to receiving the user input.
[0009] Another aspect of the disclosure provides a seatpost assembly including: a seatpost comprising an upper post and a lower post, wherein the upper post is moveable relative to the lower post between a retracted position and an extended position; and a height change assembly coupled

between the upper post and the lower post; wherein the height change assembly selectively drives the upper post from the extended position to the retracted position; and wherein the height change assembly selectively drives the upper post from the retracted position to the extended position.
[0010] Another aspect of the disclosure provides a seatpost assembly including: a lower post; an upper post movable relative to the lower post between a high position and a low position; and a height change assembly comprising a motor configured to drive the upper post between the high position and the low position.
[0011] Another aspect of the disclosure provides a seatpost assembly including: a seatpost positionable between an extended state and a retracted state; and an actuation assembly comprising an actuator, the actuator operably coupled to the seatpost, the actuator movable between a first position and a second position; wherein the seatpost moves from the extended state to the retracted state responsive to the actuator moving from the first position to the second position, and wherein the seatpost moves from the retracted state to the extended state responsive to the actuator moving from the first position to the second position.
[0012] Another aspect of the disclosure provides a method of positioning a seatpost between a plurality of states, the method including: receiving, at a height change assembly of the seatpost, a first input; causing, by the height change assembly, the seatpost to move from an extended state to a retracted state in response to the first input; receiving, at the height change assembly, a second input while the seatpost is in the retracted state; and causing, by the height change assembly, the seatpost to move from the retracted state to the extended state in response to the second input, wherein the first input and the second input are the same.
[0013] Another aspect of the disclosure provides a method of configuring a seatpost assembly between a plurality of states, the method including: switching a seatpost between an extended state and retracted state, wherein switching the seatpost includes: causing, by a height change assembly, a seatpost to move from an extended state to a retracted state in response to a first input; and causing, by the height change assembly, the seatpost to move from the retracted state to the extended state in response to a second input; wherein the seatpost is movable by the height change assembly between the extended state and the retracted state indefinitely prior to a servicing operation.
[0014] Another aspect of the disclosure provides a seatpost assembly including: a lower post having a non-circular cross-sectional shape; an upper post movable relative to the lower post between a high position and a low position; and a height change assembly operable to drive the upper post from the low position to the high position.
[0015] Another aspect of the disclosure provides a method of positioning a seatpost assembly between a plurality of states, the method including: storing, with an energy storage device, energy from a height change assembly; releasing, with a locking assembly, energy stored with the energy storage device; and storing, with the energy storage device, energy from the height change assembly responsive to the releasing of the energy stored with the energy storage device.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0016] FIG. **1** is a side view of a road bicycle used to employ a seatpost arrangement.
[0017] FIG. **2** is a side view of an off-road bicycle used to employ a seatpost arrangement.
[0018] FIG. **3** is a schematic sectional view of a seatpost arrangement according to an embodiment shown in an extended position.
[0019] FIG. **4** is a schematic sectional view of the seatpost arrangement of FIG. **3** shown in a retracted position.
[0020] FIG. **5** is a schematic sectional view of a seatpost arrangement according to an embodiment

shown in an extended position.
[0021] FIG. **6** is a schematic sectional view of the seatpost arrangement of FIG. **5** shown in a retracted position.
[0022] FIG. **7** is a front view of an embodiment of a height change assembly as shown in FIGS. **3** and **4**
[0023] FIG. **8** is a partial front view of an embodiment of a height change assembly as shown in FIGS. **5** and **6**.
[0024] FIG. **9** is a side sectional view of the height change assembly as shown in FIG. **8**, taken along line **9-9** in FIG. **8**.
[0025] FIG. **10** is a schematic sectional view of a seatpost arrangement according to an embodiment shown in an extended position and unloaded state.
[0026] FIG. **11** is a schematic sectional view of the seatpost arrangement of FIG. **10** shown in the extended position and preloaded state.
[0027] FIG. **12** is a schematic sectional view of the seatpost arrangement of FIG. **10** shown in a retracted position and unloaded state.
[0028] FIG. **13** is a schematic sectional view of the seatpost arrangement of FIG. **10** shown in the retracted position and preloaded state.
[0029] FIG. **14** is a schematic sectional view of a seatpost arrangement according to an embodiment shown in an extended position and unloaded state.
[0030] FIG. **15** is a schematic sectional view of the seatpost arrangement of FIG. **14** shown in the extended position and preloaded state.
[0031] FIG. **16** is a schematic sectional view of the seatpost arrangement of FIG. **14** shown in a retracted position and unloaded state.
[0032] FIG. **17** is a schematic sectional view of the seatpost arrangement of FIG. **14** shown in the retracted position and preloaded state.
[0033] FIG. **18***a* is a schematic view of a mechanical actuation assembly according to an embodiment in a first position.
[0034] FIG. **18***b* is a schematic view of the mechanical actuation assembly of FIG. **18**A in a second position.
[0035] FIG. **19***a* is a schematic view of an electrical actuation assembly according to an embodiment in a first position.
[0036] FIG. **19***b* is a schematic view of the electrical actuation assembly of FIG. **19**A in a second position.
[0037] FIG. **20** is a flow chart depicting a method of positioning a seatpost between a plurality of states.
[0038] FIG. **21** is a flow chart depicting a method of configuring a seatpost assembly between a plurality of states.
[0039] FIG. **22** is a flow chart depicting a method of positioning a seatpost assembly between a plurality of states.
[0040] Other aspects and advantages of the embodiments disclosed herein will become apparent upon consideration of the following detailed description, wherein similar or identical structures have similar or identical reference numerals.

DETAILED DESCRIPTION

[0041] Reference will now be made in detail to present embodiments of the disclosure, one or more examples of which are illustrated in the accompanying drawings. The detailed description uses numerical and letter designations to refer to features in the drawings. Like or similar designations in the drawings and description have been used to refer to like or similar parts of the disclosure.
[0042] The word “exemplary” is used herein to mean “serving as an example, instance, or illustration.” Any implementation described herein as “exemplary” is not necessarily to be construed as preferred or advantageous over other implementations.

[0043] As used herein, the terms “first”, “second”, “third,” and the like may be used interchangeably to distinguish one component from another and are not intended to signify location or importance of the individual components.
[0044] The terms “coupled,” “fixed,” “attached to,” and the like refer to both direct coupling, fixing, or attaching, as well as indirect coupling, fixing, or attaching through one or more intermediate components or features, unless otherwise specified herein.
[0045] The singular forms “a”, “an”, and “the” include plural references unless the context clearly dictates otherwise.
[0046] Approximating language, as used herein throughout the specification and claims, is applied to modify any quantitative representation that could permissibly vary without resulting in a change in the basic function to which it is related. Accordingly, a value modified by a term or terms, such as “about”, “approximately”, and “substantially”, are not to be limited to the precise value specified. In at least some instances, the approximating language may correspond to the precision of an instrument for measuring the value, or the precision of the methods or machines for constructing or manufacturing the components and/or systems. For example, the approximating language may refer to being within a 1, 2, 4, 10, 15, or 20 percent margin.
[0047] Here and throughout the specification and claims, range limitations are combined and interchanged, such ranges are identified and include all the sub-ranges contained therein unless context or language indicates otherwise. For example, all ranges disclosed herein are inclusive of the endpoints, and the endpoints are independently combinable with each other.
[0048] As described herein, the term “seatpost” is used in reference to an assembly for use with a seat tube of a bicycle or similar structure. The seatpost described herein can be used with mountain bicycles, road bicycles, track bicycles, time-trial bicycles, triathlon bicycles, gravel bicycles, commuter bicycles, cargo bicycles, electric bicycles (e-bikes), tricycles, and other types of wheeled vehicles.
[0049] Adjustable seatposts described herein allow a user to adjust saddle height, e.g., when transitioning between climbing and descending. The adjustable seatpost (often referred to as a dropper post) includes a post formed from a plurality of segments that move relative to one another to adjust saddle height. It should be appreciated that an adjustable seatpost may be integrated with the frame of a bicycle, for instance by interfacing a height-adjustable seatpost component directly with a seat tube of a bicycle. Seatposts as described herein, and more particularly components of the seatposts described herein, are caused to operate in response to an actuation assembly that is user operable between two or more positions. The actuation assembly is mounted to a flat, a drop bar, a hood, or another portion of a handlebar and receives a user input which is communicated to the seat post through a linkage, such as a cable linkage or Bowden cable system, a hydraulic circuit, an electrical conductor (e.g. a wired electrical communication), a wireless connection (e.g., a transmitter/receiver communication system), or the like, causing a height change assembly of the seatpost to affect saddle height.
[0050] An adjustable seatpost arrangement may generally be provided to raise and lower a desired saddle height on command. For example, a rider may benefit from a high saddle height optimized for pedaling efficiency while climbing or riding on flat and predictable terrain. The same rider may also benefit from a low saddle height so that the saddle does not interfere with rider movement when pedaling efficiency is not required and/or during technical maneuvers like descending, jumping, dismounting, or mounting. It should also be appreciated that a rider may benefit aerodynamically by lowering the saddle height, for example when descending. A bicycle rider may need to alternate between high and low positions often, especially on variable terrain or in crowded city environment with repeated starting and stopping.
[0051] The embodiments generally shown and described herein may enable a rider to more easily adjust saddle height on demand. For example, adjustable seatpost arrangements herein provide a rider with the ability to command the saddle height to change with the press of a button or a switch.

It is even contemplated that such command could be voice-operated, or even predictive based on riding data (e.g. accelerometer terrain data). Such commands may be chosen to allow a rider to raise and lower the adjustable seatpost arrangement without otherwise interfering with the riding of the bicycle. For example, embodiments as described herein would allow for full raising and lowering control of the adjustable seatpost arrangement without requiring direct force from the rider's body into the saddle, which may be disruptive to riding, particularly when entering a technical riding situation. Thus, embodiments as now described in further detail below provide the bicycle rider with fast, easy, and repeatable adjustment of saddle height so that pedaling efficiency and bicycle control can be effectively managed.

[0052] Referring now to the Drawings, FIG. **1** is a side view of a road-type configuration of a bicycle **22** used to employ an adjustable seatpost assembly **30**. The bicycle **22** includes a frame **24**, front and rear wheels **27**, **29** rotatably attached to the frame **24**, and a drive arrangement **33**. A front brake **60** is provided for braking the front wheel **27** and a rear brake **62** is provided for braking the rear wheel **29**. Each of the front and rear wheels **27**, **29** includes a tire **35** attached to a rim **31**, where the tire **35** is configured to engage a riding surface **99**. A handlebar assembly **25** is provided for steering the front wheel **27**. The direction of arrow “A” indicates a front and/or forward orientation of the bicycle **22**, also referred to herein as a direction of travel A. As such, a forward direction of movement for the bicycle **22** corresponds to the direction A.

[0053] Other configurations of the bicycle **22** are contemplated. For instance, FIG. **2** depicts the bicycle **22** having a mountain-type or off-road configuration. Potential differences between bicycles of various configurations include those depicted between FIG. **1** and FIG. **2**. For example, FIG. **1** depicts the handlebar assembly **25** in a drop-type configuration, whereas the example in FIG. **2** has a flat-type configuration of the handlebar assembly **25**. It should be appreciated that different handlebar and tire types can be combined and furthermore include a wide spectrum of bicycle types, for example off-road drop-type handlebar bicycles sometimes referred to as gravel or cyclocross bicycles. The example in FIG. **2** also includes a front suspension **26** for movably mounting the front wheel **27** to the frame **24** and a rear suspension **28** for movably mounting the rear wheel **29** to the frame **24**. The front and rear suspensions **26**, **28** may include one or more of an adjustable suspension component such as a spring or damper. An adjustable seatpost assembly **30** is also shown in each of the examples in FIGS. **1** and **2** and is configured to movably attach a saddle **32** to the frame **24**. The adjustable seating assembly **30** may include a saddle support structure **34** attachable to the saddle **32** and connected to an upper post **36**. In various embodiments, the saddle support structure **34** may be configured to securely and adjustably secure saddle rails (not shown) of the saddle **32**. The upper post **36**, the saddle support structure **34**, and the saddle **32** may be configured to move relative to a lower post **38** fixedly attached to the frame **24**. For example, the lower post **38** may be clamped into the frame **24** with a seat clamp **37**. In some embodiments, the upper post **36** may ride within the lower post **38**, where the lower post **38** is fixed to a seat tube **39** of the frame **24**. It should also be appreciated that in some embodiments, the seat tube **39** of the frame **24** may also serve as the lower post **38** of the adjustable seatpost assembly **30**.

[0054] FIGS. **1** and **2** each depict an embodiment of the drive arrangement **33** including a drive sprocket assembly **40** rotatably mounted to the frame **24**, a driven sprocket assembly **42** mounted to the rear wheel **29**, and a chain **44** engaging the drive sprocket assembly **40** and the driven sprocket assembly **42**, which may be a rear sprocket assembly. The drive sprocket assembly **40** may be attached to a crank **46** to facilitate torque transfer from a rider to the rear wheel **29** through the drive sprocket assembly **40**, to the chain **44**, and to the driven sprocket assembly **42**.

[0055] The chain **44** may be shifted through a plurality of driven sprockets of the driven sprocket assembly **42** with a rear gear changer **48** as depicted. The plurality of driven sprockets of the driven sprocket assembly **42** may be arranged by radius, for example each further outboard sprocket having a smaller radius than the last. The chain **44** may also be shifted through a plurality of drive sprockets of the drive sprocket assembly **40** with a front gear changer **50** as shown in FIG. **1**. The plurality of drive sprockets of the drive sprocket assembly **40** may be arranged by radius, for example each further outboard drive sprocket having a larger radius than the last. Alternatively, as in FIG. **2**, the front gear changer **50** may be omitted as when the drive sprocket assembly **40** consists of one of a solitary drive sprocket **40**.

[0056] As shown in FIGS. **1** and **2**, it is contemplated that various sensors may be provided on the bicycle **22**. For example, a drivetrain sensor **54** may be provided, as shown in FIG. **1**. The drivetrain sensor **54** may include a torque sensor, accelerometer, a speed sensor, a cadence sensor, or any combination of those or similar sensors. For example, the drivetrain sensor **54** may be used to detect a pedaling state which in turn may be used to control other components of the bicycle **22**, such as the adjustable seatpost assembly **30** as discussed in further detail below. In an exemplary embodiment, the drivetrain sensor **54** may be operable to detect a pedaling state indicative of required pedaling efficiency and transmit a signal to raise the adjustable seatpost assembly **30** to a high position. Additionally or alternatively, the drivetrain sensor **54** may be operable to detect a pedaling state indicative of coasting or minimal output and responsively transmit a signal to lower the adjustable seatpost assembly **30** to a low position.

[0057] Further sensors may be provided, as shown in FIG. **2** for example which includes a frame sensor **55**. The frame sensor **55** may be operable to detect a motion state of the bicycle **22** indicative of a desired saddle height and transmit a signal to operate the adjustable seatpost assembly **30** accordingly. For example, the frame sensor **55** may include an accelerometer, vibration detector, gyroscope, or other sensing device and may be used to indicate a terrain condition. In an exemplary embodiment, the frame sensor **55** may detect a motion state of the bicycle **22** indicative of a rough and/or descending terrain condition and responsively transmit a signal to lower the adjustable seatpost assembly **30** to a low position. Additionally or alternatively, the frame sensor **55** may detect a motion state of the bicycle **22** indicative of a smooth and/or ascending terrain condition and responsively transmit a signal to raise the adjustable seatpost assembly **30** to a high position.

[0058] Referring now to FIG. **3**, an embodiment of an adjustable seatpost assembly **130** is depicted in an extended position. As shown, the adjustable seatpost assembly **130** includes a lower post **138** and an upper post **136**. The lower post **138** is configured to be received in a bicycle frame, for example sized and shaped to be received in the seat tube **39** of a bicycle according to the exemplary embodiments of FIGS. **1** and **2**. It should be appreciated that the lower post **138** may be shaped with a cross-sectional shape generally matching that of the receiving component of the bicycle. For example, the lower post **138** may have a generally round cross-section, such as a circular cross-section. In various embodiments, the lower post **138** may have a non-circular cross-section, for example a teardrop cross-section or a D-shaped cross-section. Such non-circular cross-sections may be employed for frame compatibility, aerodynamics, compliance/suspension effect, and/or rotation prevention.

[0059] As shown in FIG. **3**, the upper post **136** is configured to move relative to the lower post **138**. For example, the upper post **136** as shown is slidably movable relative to the lower post along a longitudinal axis L of the adjustable seatpost assembly **130**. As such, the upper post **136** is translatable along the longitudinal axis L. The upper post **136** as shown in FIG. **3** is presently in a high position, which may also be referred to as a raised position, or an extended position or state, with these terms being used interchangeably. As shown in FIG. **4**, the upper post **136** is movable to a low position, which may also be referred to as lowered position, or a retracted position or state, with these terms being used interchangeably. It should be appreciated that a plurality of intermediate states where the upper post **136** is somewhere between the high position and the low position may also be provided. These intermediate states may represent fixed operational states or transient/transitional states between operational states. In at least one embodiment, an intermediate position of the upper post **136** is provided as a service position, for example where access to one or more components allows for service or disassembly.

[0060] Still referring to FIG. **3**, a height change assembly **150** is provided in the adjustable seatpost assembly **130**. As shown, the height change assembly **150** is entirely contained within a volume defined by the adjustable seatpost assembly **130**. Specifically, the height change assembly **150** is entirely contained within a volume defined by the upper and lower posts **136** and **138**. However, it should be appreciated that in some embodiments the height change assembly may be at least partially disposed outside of the adjustable seatpost assembly **130**, for example as shown in FIGS. **5** and **6** discussed in greater detail below.
[0061] The height change assembly **150** as shown in FIG. **3** is operable to drive the upper post **136** to the high position shown in FIG. **3** and is operable to drive the upper post **136** to the low position shown in FIG. **4**. It should be appreciated that various intermediate positions exist between the high and low positions. In some embodiments, the adjustable seatpost assembly **130** is configured to toggle between the high and low positions and only lock in these discrete positions as riding positions. In other embodiments, the adjustable seatpost assembly may be configured to lock in one or more intermediate positions to provide intermediate riding position(s) and/or intermediate service position(s).
[0062] As shown in FIG. **3**, the height change assembly **150** is disposed between the upper post **136** and the lower post **138**. Movement of the upper post **136** may be described with reference to a longitudinal travel path L. For example, movement of the upper post **136** from the low or retracted position to the high or extended position occurs in an upward direction U along the longitudinal travel path L. Movement of the upper post **136** from the extended or high position to the retracted or low position occurs in a downward direction D along the longitudinal travel path L. As shown, movement in the downward direction D may generally include a component of movement (lateral expansion) in the direction of travel A, while movement in the upward direction U may generally include a component of movement (lateral retraction) opposite the direction of travel A.
[0063] Still referring to FIG. **3**, the height change assembly **150** as shown is connected to both the upper post **136** and to the lower post **138**. The height change assembly **150** is connected to the lower post **138** with a lower height change connection **140**. The height change assembly **150** is connected to the upper post **136** with an upper height change connection **142**. The lower height change connection **140** and the upper height change connection **142** may be achieved with various structures, but as shown include respective pin structures, fixing a pivot point while allowing rotation of one or more components of the height change assembly **150** relative to the upper post **136** and/or the lower post **138**.
[0064] In FIG. **3**, a lower primary arm **144** attaches to the lower height change connection **140**. As shown, the lower primary arm **144** pairs with another lower primary arm **144**, which may provide for tuning of weight and strength characteristics. It should be appreciated that any number of one or more lower primary arms **144** and corresponding similar arm or linkage structures described herein may be combined. The lower primary arms **144** as shown cooperate with upper primary arms **154**. As described herein, the lower primary arms **144** and the upper primary arms **154** are generally coupled, and may be coupled directly (see, e.g. FIGS. **5** and **6**) or may be coupled through one or more secondary arms **146**, including a plurality of secondary arms **146** as shown in FIG. **3**.
[0065] Still referring to FIG. **3**, the lower primary arms **144** and the upper primary arms **154** are coupled together by a plurality of secondary arms **146**. As shown, the secondary arms **146** are arranged in sets, each set including two of the plurality of secondary arms **146**. The lower primary arms **144** and the upper primary arms **154** are each coupled to the secondary arms **146** through an arm outside pivot **148**. Further, each set of secondary arms **146** is connected to an adjacent set through the arm outside pivots **148**. As shown between FIGS. **3** and **4**, movement of the height change assembly **150** through its travel results in movement of the arm outside pivots **148** along the longitudinal travel path L and orthogonally to the longitudinal travel path L (i.e. radially inwards and outwards from an axis defined by movement of the upper post **136** along the longitudinal travel path L). In some embodiments, such orthogonal movement of the arm outside pivots **148** may be

used to regulate locking and unlocking, as discussed in greater detail below. As shown, each set of the secondary arms **146** may be connected with an arm center pivot **152**. The movement of the height change assembly **150** through its travel results in movement of the arm center pivots **148** generally along the longitudinal travel path L. In FIGS. **3** and **4**, no movement outside of the longitudinal travel path L is traveled by the arm center pivots **148**.

[0066] Arrangements like that described in the paragraph directly above may generally be referred to as a scissor linkage. In such scissor linkage arrangements, the plurality of secondary arms **146** may be identical, for example to save in production cost or aid in assembly and repair. In other embodiments, individual ones of the plurality of secondary arms **146** may be tuned for various characteristics including strength, weight, rotational inertia, frictional resistance, or compliance concerns (e.g., to provide a suspension effect in one or more positions).

[0067] Still referring to FIG. **3**, the height change assembly **150** includes a driving wheel **156**. As will be discussed in further detail with reference to FIG. **7** below, the driving wheel **156** may be driven by a cable **158** directly or through one or more further structures. The cable **158** shown may generally be of a Bowden cable type, traveling through a cable housing **160**. As shown, the cable housing terminates in a post housing stop **162**. In this arrangement, the effective length of the cable **158** operating between the post housing stop **162** and further structures can be controlled. For example, an actuation assembly (see, e.g. FIGS. **18**A, **18***b*) may selectively pull and release or push the cable **158**. As shown in FIG. **3**, the cable **158** interacts with the height change assembly **150** to rotate the driving wheel **156**. Rotation of the driving wheel **156** is linked with rotation of at least one other component of the height change assembly **150** so as to drive the linkage as described above including the lower primary arms **144**, the upper primary arms **154**, and the secondary arms **146**. For example, a connecting rod may be provided to drive an arm center pivot **152** as shown in greater detail with reference to FIG. **7** below.

[0068] Various structures may be employed to control rotation of the driving wheel **156**. For example, a locking detent **164** may be provided to maintain a position of the driving wheel **156**. As shown, the locking detent **164** may be configured to interact with one or more corresponding features on the driving wheel **156**, such as a driving wheel locking recess **166**. The locking detent **164** may serve to lock the adjustable seatpost assembly **130** in the upper position, the lower position, or one or more other positions. In some embodiments, the locking detent **164** may serve as a secondary locking device, where at least one further locking device serves to handle loads applied to the adjustable seatpost assembly **130**. For example, the locking detent **164** may be configured as a rolling detent tunable to resist rotation during reset operations of the driving wheel **156** while not strong enough to transmit dangerous loads to the height change assembly **150**. Such a configuration of the locking detent **164** may be described as an embodiment of a clutch for the height change assembly **150** to prevent damage. As such, the locking detent **164** may be tuned to unlock or to allow slip at a threshold condition. The threshold condition may be described as a predefined force or impulse level beyond which damage to one or more components may occur.

[0069] Still referring to FIG. **3**, one or more locking structures may interact directly between the upper post **136** and the lower post **138**. For example, a linkage lock assembly **168** may be provided to lock the upper post **136** to the lower post **138** in at least one position. As shown, the linkage lock assembly **168** extends generally orthogonally relative to the longitudinal travel path L with raising of the adjustable seatpost assembly **130**. The linkage lock assembly **168** shown interfaces with one or more secondary arms **146** and/or arm outside pivots **148** such that opposing locking features extend outward and generally perpendicularly to movement of the arm center pivots **152**. For example, a right-hand side secondary arm **146** may control a portion of the linkage lock assembly **168** extending to the left-hand side of the adjustable seatpost assembly **130** and a left-hand side secondary arm **146** may control a portion of the linkage lock assembly **168** extending to the right-hand side of the adjustable seatpost assembly **130**. Corresponding features of the linkage lock assembly **168** may be sized and shaped to interface with locking features on one or more of the

upper post **136** or the lower post **138**. For example, the depicted configuration allows the linkage lock assembly **168** to extend through at least one of an upper post recess **170** formed in an upper post inner surface **169** and into at least one of a lower post recess **172** formed in a lower post inner surface **171**. Thus, the linkage lock assembly **168** may serve to directly lock the upper post **136** to the lower post **138** without unduly loading further components of the height change assembly **150**.
[0070] Although the above-described configuration of the linkage lock assembly **168** serves to lock in the upper, high, or extended position of the adjustable seatpost assembly **130**, it should further be appreciated that the linkage lock assembly **168** may be further configured to lock in additional positions, including the lower, low, or retracted position. For example, as shown with reference to FIG. **4**, where components of the linkage lock assembly **168** are generally hidden within a collapsed scissor linkage arrangement, further linkage lock components (not shown) could be configured to extend to the right-hand side from the right-hand side components of the linkage and vice-versa, thus extending to lock through the upper post **136** and the lower post **138** in this lower position.
[0071] Referring again to FIG. **3**, additional locking structures may yet be provided to selectively lock the upper post **136** in one or more positions. For example, a low stop **174** may be provided to prevent movement beyond the low position of the adjustable seatpost assembly **130**. As shown, the low stop includes at least one low stop surface **176** sized and shaped to impinge upon the upper post **136** at or below the low position of the adjustable seatpost assembly **130**. The upper post **136** as shown includes an upper post stop surface **178** sized and shaped to interface with the low stop surface **176** of the low stop **174**. As shown, the low stop **174** may be connected to or integral with lower post **138**. For example, the low stop **174** may be disposed on the lower post inner surface **171** in which the lower post recess **172** is formed. As described, the embodiment shown in FIG. **3** provides for selectively locking the upper post **136** in the high position with the linkage lock assembly **168** and selectively locking the upper post in the low position with the low stop **174**. Furthermore, the locking detent **164** may additionally provide locking in each of these positions, for example to resist upward movement of the upper post **136** from the low position shown in FIG. **4**.
[0072] The low stop **174** may further be attached to a bottom cap **180**. The bottom cap **180** may generally be removable from the adjustable seatpost assembly **130**. For example, the bottom cap **180** may be threaded and/or pinned to the lower post **138**. The bottom cap **180** may serve as a carrier for various components, including the height change assembly **150**. For example, various components may interface directly or indirectly with a bottom cap inside surface **181** of the bottom cap **180**. As shown in FIGS. **3** and **4**, and with further detail in FIG. **7**, the driving wheel **156** may be attached to the bottom cap **180** through the lower height change connection **140**. Accordingly, removal of the bottom cap **180** can facilitate removal of the height change assembly **150** for service.
[0073] Still referring to FIG. **3**, an endcap **182** may be provided between the upper post **136** and the lower post **138**. As shown, the endcap **182** is removably coupled to the lower post **138**, for example through a threaded connection. It should be appreciated that a pinned, slotted, or otherwise indexed configuration may be used, for example where relative rotation of the endcap **182** is important (i.e. non-circular cross-section embodiments and/or embodiments including locking features in an endcap such as that described with reference to FIGS. **14-17**). The endcap **182** may further include one or more features to restrain movement of the upper post **136** in the high position, for example to prevent over-extension. In such a configuration, the endcap **182** may be removable to facilitate removal of the upper post **136** from the lower post **138**.
[0074] Also shown in FIG. **3**, a post seal assembly **184** may be provided. The post seal assembly **184** may include a seal, such as a lip or wiper seal, disposed circumferentially about the upper post **136** and configured to resist intrusion of environmental debris into the volume defined within the upper post **136** and the lower post **138**. Further features of the post seal assembly **184** may include

debris clearances, lubricating rings, debris scrapers, etc. As shown, the post seal assembly **184** may be connected to or integrated with the endcap **182**. Accordingly, the endcap **182** may be removable to facilitate service or replacement of at least a portion of the post seal assembly **184**.

[0075] The arrangement described with reference to FIG. **3** above may be used to repeatedly drive the upper post **136** between its extended and retracted positions (shown in FIGS. **3** and **4**, respectively) using mechanical input from the cable **158**. Accordingly, the height change mechanism **150** used herein may rely solely on this mechanical input to drive the upper post **136** both in the upward direction U and in the downward direction D along the longitudinal travel path L. Such a configuration may thus be free of external power sources or stored potential energy including but not limited to pre-compressed springs, pressure vessels, capacitors, or batteries. Such a configuration may also facilitate movement of the upper post **136** by the height change assembly **150** indefinitely prior to a servicing operation, for example 100, 1000, or 10,000 repetitions. It should be appreciated that a servicing operation may be necessary depending on environmental contamination but independent of loss of power or stored energy.

[0076] The driving of the upper post **136** relative to the lower post **138** is achieved by movement of the height change assembly **150** as shown in FIGS. **3** and **4**. As discussed in greater detail below, for example with reference to FIGS. **18**A and **18***b*, the height change assembly **150** may operate to drive the upper post **136** responsive to one or more user inputs, for example directly from a seatpost input device (not shown) on the adjustable seatpost assembly **130** or from an actuation assembly as shown in FIGS. **18**A, **18***b*, **19***a*, and/or **19***b.*

[0077] The movement of the upper post **136** in turn is used to move a saddle (see FIGS. **1** and **2**). Referring again to FIG. **3**, the upper post **136** includes a saddle support structure **134**. The saddle support structure **134** is generally configured to accept a bicycle seat or saddle and control its relative position to the upper post **136**. As shown, the saddle support structure **134** includes a saddle reference structure **135** fixed relative to the upper post **136**. For example, the saddle reference structure **135** may be integral to the upper post **136** and used to define a relationship between the attached saddle and the adjustable seatpost assembly **130**. Beyond the saddle reference structure, a lower saddle clamp **137** and an upper saddle clamp **139** may be provided and fastened with one or more of a saddle clamp fastener **141**. This arrangement may be used to finely adjust and fix a desired angle and/or fore-aft position of the saddle (not shown) relative to the adjustable seatpost assembly **136**, for example by clamping to a set of saddle rails (not shown) fixed to the saddle (not shown).

[0078] Still referring to FIG. **3**, the saddle support structure **134** may as described above be at least in part fixed to the upper post **136**. Accordingly, once a saddle (not shown) is mounted, the saddle and saddle support structure **134** may move along the longitudinal travel path L with the upper post **136** between the low and high positions of the adjustable seatpost assembly **130**. It should be appreciated that a relative position, including angle and fore-aft positioning, of the saddle (not shown) and saddle support structure **134** may be maintained through the travel of the adjustable seatpost assembly **130** along its entire movement along the longitudinal travel path L. Thus, an angle of the saddle (not shown) and its saddle support structure **134** in a fastened state, measured with respect to the longitudinal axis of the adjustable seatpost assembly (i.e. the longitudinal travel path L centered around the lower post **138** and/or the upper post **136**), can be maintained the same with the upper post **136** in the high position, in the low position, and in one or more intermediate positions between the high and low positions.

[0079] Referring now to FIG. **4**, the adjustable seatpost assembly **130** as described above is depicted in the retracted position. As shown by the adjustment of the upper post **136** from FIG. **3** to FIG. **4**, the height change assembly **150** is operable to drive the adjustable seatpost to the low position. For example, the cable **158** may be pulled to operate the driving wheel **156**, which in turn drives the lower primary arms **144**. As shown between FIGS. **3** and **4**, the driving wheel **156** may generally rotate approximate one hundred eighty (180) degrees between up and down positions. In such an embodiment, driving of the height change assembly **150** through the driving wheel **156** may toggle between upper and lower positions with successive rotations in the same direction (i.e. a clockwise direction). It should also be appreciated that a height change assembly **150** may also be configured with any number of discrete rotational positions corresponding to up and down positions of the adjustable seatpost assembly **130** per revolution of the driving wheel **156**. For example, the driving wheel **156** may be configured to raise or lower the upper post **136** with each successive rotation of ninety (90) degrees.

[0080] Between FIGS. **3** and **4**, it is shown that the linkage defined by the lower primary arms **144**, the upper primary arms **154**, the secondary arms **146**, the arm outside pivots **148**, and the arm center pivots **152** expands and collapses with driving of the driving wheel **156**. Accordingly, the height change assembly **150** as described provides driven movement from the lower position to the upper position and from the upper position to the lower position. As the driving wheel **156** is driven, for example in a single rotational direction as described above, the lower primary arms **144** rotate, with the secondary arms **146** rotating responsive to this rotation, and further with the upper primary arms **154** rotation responsive to this rotation. Although the driving wheel **156** as shown in FIGS. **3** and **4** is actuated by a pull of the cable **158**, it should be appreciated that various other structures may be used additionally or alternatively to provide motive force to the driving wheel **156** and the height change assembly **150** generally. For example, a motor, for example as described with reference to FIGS. **10-17**, may be provided to directly or indirectly drive the driving wheel **156**.

[0081] Still referring to FIG. **4**, it should be appreciated that the height change assembly **150** may also serve to provide resistance to relative rotation between the upper post **136** and the lower post **138**. As shown, the rotational orientation of the height change assembly **150** may be fixed through the upper height change connection **142** at the upper post **136** and through the lower height change connection **140** at the lower post **138**. Additionally or alternatively, further anti-rotation features may be provided. For example, the upper post **136** and/or the lower post **138** may be provided with a generally non-circular cross-section to resist rotation, may be rotationally keyed relative to one another, or may be keyed relative to another structure such as the endcap **182**. In an embodiment, a plurality of rotational keys ride between corresponding features in at least one of the upper post **136** and the lower post **138**.

[0082] Turning now to FIG. **5**, an embodiment of an adjustable seatpost assembly **230** is depicted in an extended position. The adjustable seatpost assembly **230** of FIG. **5** depicts a height change assembly **250** movable at least in part external to a volume defined within an upper post **236** and a lower post **238** of the adjustable seatpost assembly **230**. As in other embodiments, the upper post **236** includes a saddle support structure **234**. The saddle support structure **234** is generally configured to accept a bicycle seat or saddle and control its relative position to the upper post **236**. As shown, the saddle support structure **234** includes a saddle reference structure **235** fixed relative to the upper post **236**. For example, the saddle reference structure **235** may be integral to the upper post **236** and used to define a relationship between the attached saddle and the adjustable seatpost assembly **230**. Beyond the saddle reference structure **235**, a lower saddle clamp **237** and an upper saddle clamp **239** may be provided and fastened with one or more of a saddle clamp fastener **241**. This arrangement may be used to finely adjust and fix a desired angle and/or fore-aft position of the saddle (not shown) relative to the adjustable seatpost assembly **230**, for example by clamping to a set of saddle rails (not shown) fixed to the saddle (not shown).

[0083] Still referring to FIG. **5**, operation of the height change assembly **250** results in a driving force acting on the saddle support structure **234** through the upper post **236** in the upward direction U or the downward direction D along the longitudinal travel path L. The upper post **236** may be constrained along the longitudinal travel path L between upper and lower positions, for example by stop features provided on the lower post **238** and/or an endcap **282**. A sealing arrangement, for example as described above with reference to FIGS. **3** and **4**, may be provided as a post seal assembly **284**, which may further be connected to or integrated with the endcap **282**.

[0084] In FIG. **5**, the height change assembly **250** is mounted or mountable on a bottom cap **280**, and specifically to a bottom cap inside surface **281**. The bottom cap **280** may be removable, for example threadably removable, to facilitate assembly, disassembly, and/or service. The height change assembly **250** shown may also be spaced apart from a lower post inner surface **271** of the lower post **238** and from an upper post inner surface **269** of the upper post **236**. This spaced apart configuration facilitates movement of the upper post **236** between at least a portion of the height change assembly **250** and the lower post inner surface **271** of the lower post **238** throughout the travel of the upper post **236**. As shown, the bottom cap **280** may provide control of one or more communication or transmission structures from an actuation device (not shown). For example, the bottom cap **280** may be shaped and sized, for example with a post housing stop **262**, to control a cable housing **260** for running a cable **258** therethrough. Accordingly, the bottom cap **280** may facilitate a driving force imparted from the cable **258** and constrained cable housing **260** to act upon the height change assembly **250**, for example upon a driving wheel **256** of the height change assembly **250**. Additionally or alternatively, an internal housing stop **263** may be provided to control the cable housing **260**. For example, the internal housing stop **263** may facilitate routing of the cable housing **260** into the volume defined between the upper post **236** and the lower post **238**. The internal housing stop **263** may also provide additional cable routing options. For example, providing both the internal housing stop **263** and the post housing stop **262** as shown in FIG. **5** may facilitate cable routing through the bicycle seat tube (known as “internal” or “stealth” routing) and external routing without directly entering the bicycle frame. Such a configuration may thus be versatile between both application without modification.

[0085] The driving wheel **256** of FIGS. **5** and **6** is supported with a wheel support structure **249** and may generally be configured as the driving wheel described with reference to FIGS. **3** and **4**. Alternatively, the driving wheel **256** may be configured differently. For example, the driving wheel **256** depicted in FIGS. **5** and **6** may generally be rotatable in two opposite rotational direction. In an embodiment, one extreme rotational position of the driving wheel **256** in a first direction corresponds with the upper position of the adjustable seatpost assembly **230** (i.e. shown in FIG. **5**) and another extreme rotational position of the driving wheel **256** in a second direction, opposite the first direction, corresponds with the lower position of the adjustable seatpost assembly **230** (i.e. shown in FIG. **6**). Further description of possible configurations of the driving wheel **256** (and the driving wheel **156** of FIGS. **3** and **4**) may be found with reference to FIGS. **7-9** below.

[0086] Still referring to FIG. **5**, a lower arm **244** may be provided in connection with the lower post **238** and an upper arm **254** may be provided in connection with the upper post **236**. As shown, the lower arm **244** attaches to the lower post **238** through a lower height change connection **240**, for example connected to the driving wheel **256** as described above. The upper arm **254** may connect through various structure(s) to the upper post **236** with an upper height change connection **242**. As shown, the upper arm **254** is coupled to the upper post **236** with a pinned configuration of the upper height change connection **242** and the lower arm **244** is coupled to the lower post (through the driving wheel **256**) with a pinned configuration of the lower height change connection **240**. The lower arm **244** and the upper arm **254** may be directly connected to one another, for example through an inter-arm pivot **248** as shown in FIG. **5**. As such, the lower arm **244** may be rotatably coupled with the upper arm **254** about a rotational axis defined by the inter-arm pivot **248**. Such a rotational axis may generally be orthogonal to the lifting axis of the adjustable seatpost assembly **230** along the longitudinal travel path L. Although not shown, a spring (e.g., a torsional spring) or other biasing arrangement may be provided to bias the upper arm **254** and the lower arm **244** relative to one another, for example to counter a gravitational force. The spring or other biasing arrangement can be tuned in view of saddle weight, attached accessories, rider preference, or the like.

[0087] As shown between FIGS. **5** and **6**, the upper arm **254** is generally configured to drive the upper post **236** responsive to driving of the lower arm **244**. Specifically, the upper arm **254** is configured to rotate relative to the upper post **236** responsive to rotation of the lower arm **244** relative to the lower post **238**. The lower arm **244** is shown to include an arm stop surface **279** configured to control movement of the upper post **236**. For example, as shown in FIG. **6**, the arm stop surface **279** interacts with the upper arm **254** (for example at a complimentary stop surface) to resist further movement in the downward direction of the upper post **236**. In an embodiment, the arm stop surface **279** is configured as a suspension component, for example with an elastomeric construction to facilitate suspension motion of the upper post **236**. The elastomeric construction can be tuned, for example in view of rider weight, terrain type, or the like to provide suspension motion with the adjustable seatpost assembly **230** in the lower position.

[0088] Also shown in FIGS. **5** and **6**, the upper post **236** may be provided with a post stop surface **278** to control movement of the upper post **236**. As shown in FIG. **5**, the post stop surface **278** may control movement of the upper post **236** by constraining movement of the lower arm **244** and/or the upper arm **254**. In an embodiment, the post stop surface **278** is configured as an elastomeric stop and may provide a suspension effect. The post stop surface **278** can be tuned, for example in view of rider weight, terrain type, or the like to provide suspension effect with the adjustable seatpost assembly **230** in the raised position. Tuning can be performed, for example, by swapping between different post stop surface materials during servicing, or even on demand while riding. In an embodiment, the adjustable seatpost assembly **230** can include a lockout that prevents suspension effect via the post stop surface **278**. As shown, the post stop surface **278** is sized and shaped to allow inversion or “knee locking” of the lower arm **244** and the upper arm **254**. Accordingly, the lower arm **244** and the upper arm **254** may be used to lock the upper post **236** in the upper position, with unlocking achievable by slightly raising the upper post **236** with operation of the driving wheel **256**. It should be appreciated that one or more secondary locking features, for example a detent lock on the driving wheel **256** may resist unintentional unlocking at the upper position of the upper post **236**.

[0089] The adjustable seatpost assembly **230** of FIG. **5** further depicts a service access opening **285**. The service access opening **285** can be part of the upper post **236**. As shown, the service access opening **285** facilitates disassembly of the adjustable seatpost assembly **230** by removal of the upper post **236** and associated components from the lower post **238** and associated components. In the depicted embodiment, the service access opening **285** is disposed such that, at an intermediate position between the upper and lower positions along the longitudinal travel path L, the service access opening **285** aligns with the inter-arm pivot **248**. At this intermediate position (i.e. a service position), the inter-arm pivot **248** may be removable, for example with a tool or else toollessly, thus disconnecting the upper arm **254** from the lower arm **244**. It should be appreciated that this embodiment of the service access opening **285** is exemplary and that further positions may be provided and that other disassembly points, such as the lower height change connection **240** and/or the upper height change connection **242** may be provided. In an embodiment, the service access opening **285** aligns with the inter-arm pivot **248** at a position above the inverted “knee locked” upper position to facilitate disassembly. Such various configuration may all be employed to allow servicing internal components of the adjustable seatpost assembly **230**, for example the height change assembly **250** while the lower post **238** is disposed in, such as locked in, the seat tube **39** of the bicycle **22** (see, e.g. FIGS. **1** and **2**). That is, the seatpost assembly **230** may be serviced while one or more portions thereof (such as the lower post **238**) remain connected (fixed) to the bicycle **22**.

[0090] Still referring to FIG. **5**, further openings into the volume defined by the upper post **236** and the lower post **238** may be provided. For example, as shown in FIGS. **5** and **6**, an arm clearance opening **255** may be provided to facilitate movement of at least a portion of the height change assembly **250** beyond the volume defined by the upper post **236** and the lower post **238**. As shown in FIG. **5**, the height change assembly **250** may be entirely contained within the volume defined by the upper post **236** and the lower post **238** when the upper post **236** is in the raised position. As shown in FIG. **6**, at least a portion of the upper arm **254**, the lower arm **244**, and the inter-arm pivot **248** may exit the volume defined by the upper post **236** and the lower post **238** through the arm clearance opening **255** when the upper post **236** is in the lower position. It should also be appreciated that the arm clearance opening **255** may also be used to perform service operations, such as disconnection of the upper arm **254** from the lower arm **244** as described above with reference to the service access opening **285**.

[0091] FIG. **6** shows the inter-arm pivot **248** disposed entirely external to the volume defined by the upper post **236** and the lower post **238**. In this arrangement, an arm seal arrangement **283** may be provided to resist debris entry into the volume defined by the upper post **236** and the lower post **238**. As shown, the arm seal arrangement **283** may be a flexible, for example an elastomeric, covering over the arm clearance opening **255**. In an embodiment, the arm seal assembly **283** provides a force to the height change assembly **250**. For example, the arm seal assembly **283** as shown in FIG. **6** may provide a spring force on the inter-arm pivot **248**, biasing the lower arm **244** and the upper arm **254** in opposing rotational directions around the inter-arm pivot **248** and biasing the upper post **236** towards the raised position. The arm seal assembly **283** may be disconnectable from the upper post **236** to allow entry into the volume through the arm clearance opening **255**. For example, the arm seal assembly **283** may be captured at the upper post **236** by a clamp retention feature, one or more threaded fasteners engageable with the upper post **236**, an adhesive or hook and loop type fastener, a magnetic interface, or a tongue and groove arrangement. In some instances, the arm seal assembly **283** remains coupled to the upper post **236** and includes an opening which may be selectively opened and closed to permit access to the arm clearance opening **255**.

[0092] Referring to FIG. **6**, the adjustable seatpost assembly **230** is depicted in the retracted position. It should be noted that angles of the lower arm **244** and the upper arm **254** relative to the longitudinal travel direction L generally increase upon moving from the extended position to the retracted position. For example, the raised position depicted in FIG. **5** shows the lower arm **244** and the upper arm **254** close to parallel with the longitudinal travel direction L while the lowered position depicted in FIG. **6** shows the lower arm **244** and the upper arm **254** close to perpendicular with the longitudinal travel direction L.

[0093] Turning now to FIG. **7**, a front sectional schematic view of a height change assembly **550** is depicted. It should be appreciated that the height change assembly **550** as depicted generally corresponds to that depicted in FIGS. **3** and **4**, but may be applicable to various embodiments described herein as with other height change assemblies described. As shown in FIG. **7**, the height change assembly **550** is external to any adjustable seatpost assembly, for example prior to assembly or during a service procedure. A wheel support structure **549** is provided to support various components of the height change assembly **550**. For example, the wheel support structure **549** depicted is configured to mount a driving wheel **556** with a driving wheel shaft **557** and a ratchet wheel **558** with a ratchet wheel shaft **559**. The height change assembly **550** may also be mountable to a lower post (for example a bottom cap inside surface as described with reference to FIGS. **3-6** and **10-17**) or may be integral with a lower post.

[0094] As shown in FIG. **7**, the ratchet wheel **558** is actuatable through an actuation interface **555**. The actuation interface **555** may be configured as a cable stop or a pinch bolt or the like for controlling a cable as described with reference to FIGS. **3-6** above. Alternatively or additionally, the actuation interface **555** may be a motorized interface. Through the actuation interface **555**, the ratchet wheel **558** is rotatably driven responsive to a user input. The ratchet wheel **558** in turn drivingly interacts with the driving wheel **556** through a ratchet interface **561** as shown. The ratchet interface **561** depicted in FIG. **7** is an axial ratchet interface including sprung pawls, however it should be appreciated that various other ratchet interfaces, including radial ratchet interfaces may be provided. For example, a radial ratchet interface may be disposed radially between the ratchet wheel **558** and the driving wheel **556**, where the ratchet wheel **558** and the driving wheel **556** axially overlap with respect to the ratchet wheel shaft **559** and/or the driving wheel shaft **557**.

[0095] Responsive to rotation of the driving wheel **556** in FIG. **7**, a connecting rod **566** is driven through a connecting rod pivot **567**. The connecting rod **566** in turn drives a linkage assembly, here shown as including lower primary arms **544**, secondary arms **546**, arm outside pivots **548**, and an arm center pivot **552** through which the connecting rod **566** is drivably connected with the linkage assembly. Movement of the connecting rod may be constrained at least in part by a wheel support cap **569**, which in turn may provide mounting points for the linkage assembly, for example through a lower height change connection **540** at one or more of the lower primary arms **544**.

[0096] Still referring to FIG. **7**, rotation of the ratchet wheel **558** may be achieved through the actuation interface **555**. Upon relaxing of driving force from the actuation interface **555**, the ratchet wheel **558** may be configured to return to an origin position, for example under force of one or more return springs. The driving wheel **556** is configured such that it generally rotates with the driven rotation of the ratchet wheel **558** but not with such return rotation of the ratchet wheel **558**. For example, various locking mechanisms as described throughout may maintain the driving wheel **556** in position during return of the ratchet wheel **558** to its origin position. Accordingly, the driving wheel **556** may rotate unidirectionally with successive driving rotations of the ratchet wheel **558**, for example to achieve approximately one hundred eighty (180) degrees of rotation with successive actuations of the ratchet wheel **558**.

[0097] Turning now to FIG. **8**, a close-up schematic view of a height change assembly **650** is depicted. Although the embodiment shown in FIGS. **8** and **9** generally corresponds with that depicted in FIGS. **5** and **6**, it should be appreciated that the height change assembly **650** as described herein is generally applicable to various embodiments. As shown, the height change assembly **650** includes a driving wheel **656** supported by a wheel support structure **649** through at least one driving wheel shaft **657**. The driving wheel shaft **657** may be arranged in this configuration to have bearing surfaces configured to interface with bearings (not shown) disposed in the wheel support structure **649**. Driving of the driving wheel **656** in turn drives a lower arm **644**. Driving of the driving wheel **656** may be accomplished by a motor or other drive arrangement, or through an actuation shaft **667** controlled with a cable **658** as shown in FIGS. **8** and **9**.

[0098] Operation of the actuation shaft **667** with the cable generally provides driven motion of the actuation shaft **667** in one direction, where the actuation shaft **667** may return under return force (for example through a return spring arrangement) when actuation force is released. As shown, the actuation shaft **667** operates drivingly in the downward direction D and returns in the upward direction U. Movement of the actuation shaft **667** in turn affects the driving wheel **656** through constraint of an actuation rod **666** in an actuation shaft slot **669** of the actuation shaft **667** and in a driving wheel slot **659** of the driving wheel **656**.

[0099] Referring now to FIG. **9**, a side sectional view taken along line **9-9** in FIG. **8** is depicted. As shown in FIG. **9**, movement of the actuation shaft **667** through a driving force from the cable **658** may in turn rotate the driving wheel **656**. For example, the actuation shaft slot **669** is moved in the downward direction D, in turn moving the actuation rod **666** in the downward direction D. In this example, downward movement of the actuation rod **666** results in its capture in a driving wheel slot travel feature **679** of the driving wheel **656**. The driving wheel slot travel feature **679** constrains the actuation rod **666**, ensuring further driven movement in the downward direction D results in rotation of the driving wheel **656** about its driving wheel shaft **657** and associated axis. Additionally, the driving wheel slot travel feature **679** may serve to allow movement of the actuation shaft **667** independent of rotation of the driving wheel **656**, for example to lower a locking bar or detent (not shown) locking the driving wheel **656**. Continued driven movement in the downward direction D results in a complete rotation of the driving wheel **656**. For example, where FIG. **9** may show an analogous operational position to the downward position of FIG. **6**, complete rotation of the driving wheel **656** by the actuation shaft **667** moving in the downward direction D in FIG. **9** may toggle to an analogous operational position to the upward position of FIG. **5**. It should be appreciated that various detent or locking mechanisms as described elsewhere herein may be employed to maintain the rotational position of the driving wheel **656** during resetting operation of the actuation shaft **667** and the actuation rod **666**, for example to resist friction of the actuation rod **666** traveling up and across the driving wheel slot **659**.

[0100] Turning now to FIG. **10**, a schematic sectional view of an adjustable seatpost assembly **330** is shown in an extended position and unloaded state. The adjustable seatpost assembly **330** of FIG. **10** depicts a height change assembly **350** that is both drivable and loadable or pre-loadable, as described in greater detail below. As in other embodiments, a lower post **338** is configured to mount to a bicycle frame and an upper post **336** includes a saddle support structure **334**. The saddle support structure **334** is generally configured to accept a bicycle seat or saddle and control its relative position to the upper post **336**. As shown, the saddle support structure **334** includes a saddle reference structure **335** fixed relative to the upper post **336**. For example, the saddle reference structure **335** may be integral to the upper post **336** and used to define a relationship between the attached saddle and the adjustable seatpost assembly **330**. Beyond the saddle reference structure **335**, a lower saddle clamp **337** and an upper saddle clamp **339** may be provided and fastened with one or more of a saddle clamp fastener **341**. This arrangement may be used to finely adjust and fix a desired angle and/or fore-aft position of the saddle (not shown) relative to the adjustable seatpost assembly **336**, for example by clamping to a set of saddle rails (not shown) fixed to the saddle (not shown).

[0101] In FIG. **10**, the height change assembly **350** is mounted or mountable on a bottom cap **380**, and specifically to a bottom cap inside surface **381**. The bottom cap **380** may be removable, for example threadably removable, to facilitate assembly, disassembly, and/or service. The height change assembly **350** shown may also be spaced apart from a lower post inner surface **371** of the lower post **338** and from an upper post inner surface **369** of the upper post **336**. This spaced apart configuration facilitates movement of the upper post **336** between at least a portion of the height change assembly **350** and the lower post inner surface **371** of the lower post **338** throughout the travel of the upper post **336**. As shown, the bottom cap **380** may provide control of one or more communication or transmission structures from an actuation device (not shown). Operation of the height change assembly **350** results in a driving force acting on the saddle support structure **334** through the upper post **336** in the upward direction U or the downward direction D along the longitudinal travel path L. The upper post **336** may be constrained along the longitudinal travel path L between upper and lower positions, for example by stop features provided on the lower post **338** and/or an endcap **382**. A sealing arrangement, for example as described above with reference to FIGS. **3-6** may be provided as a post seal assembly **384**, which may further be connected to or integrated with the endcap **382**.

[0102] Still referring to FIG. **10**, the height change assembly **350** is depicted as a motorized height change assembly. Accordingly, the height change assembly **350** includes a motor **310** controlled by a motor controller **311** and powered by a motor power source **312** (such as a battery). The motor **310** is operable to drive an output shaft **314**. The output shaft **314** is configurable to provide driving force to the adjustable seatpost assembly **330** through various structures. As shown in FIG. **10**, the output shaft **314** is configured to drive a carrier **387**. The carrier **387** as shown is operable to drive the upper post **336** relative to the lower post **338**. As described in greater detail below, the carrier **387** may be configured to drive an energy storage device **390** which in turn may selectively drive the upper post **336** upwards and/or downwards. Selective control of the energy storage device **390** may be achieved with a locking assembly **316**. As shown, the locking assembly **316** includes at least one locking feature **317** operable to lock the upper post **336** relative to the lower post **338**. As such, the locking assembly **316** facilitates preloading of the adjustable seatpost assembly **330** with the energy storage device **390** and releasing of preloaded energy from the energy storage device **390** with operation of the locking assembly **316**. As shown, the locking assembly **316** is configured to interact with one or more locking passages **395**. For example, the locking feature **317** may be sized and shaped to selectively insert into and retract from a first set of the locking passages **395** to lock the adjustable seatpost assembly **330** in the extended position and a second set of the locking passages **395** to lock the adjustable seatpost assembly **330** in the retracted position.

[0103] Communication to the height change assembly **350** may be effected through one or more communication features. As shown in FIG. **10**, an internal communication feature **318** may be provided on the lower post **338** for internal or stealth routing and/or an external communication feature **320** may be provided on the upper post **336**, an upper portion of the lower post **338**, or the endcap **382** as shown. The communication features **318**, **320** may generally accept routing of electrical conductors to send and/or receive signals and/or power between the adjustable seatpost assembly **330** and another component such as an actuation assembly shown in FIGS. **19**A and **19***b*.

[0104] As will be discussed in greater detail below with reference to FIGS. **10-13**, the motor **310** is configured to impart a driving force on the energy storage device **390** through the carrier **387** and a tension device **389**. The carrier **387** may facilitate driving energy into the energy storage device **390** for release in the upward direction U and the tension device **389** may facilitate driving energy into the energy storage device in the downward direction D. As shown in FIG. **10** with the energy storage device **390** in an unloaded state, an energy storage device lower carrier **391** maintains the energy storage device **390** above an energy storage device lower stop **393** fixed to the lower post **338**. Similarly, an energy storage device upper carrier **392** maintains the energy storage device below an energy storage device upper carrier **392**.

[0105] It should be appreciated that while the state in FIG. **10** is herein referred to as an unloaded state, the energy storage device **390** may still be under load. For example, a coil spring embodiment of the energy storage device **390** may be preloaded in this unloaded state between the energy storage device lower stop **393** and the energy storage device upper stop **394** while still not being actively loaded through operation of the motor **310**. Generally speaking, driving operation of the carrier **387** in the upward direction U drives a carrier stop **388** upwards into the energy storage device lower carrier **391** to move it off of the energy storage device lower stop **393** to store energy for a lifting operation. Driving operation of the tension device **389** in the downward direction D drives the energy storage device upper carrier **392** downwards to move it off of the energy storage device upper stop **394** to store energy for a lowering operation. As discussed in greater detail below, the tension device **389** and the carrier **392** are configured so as to not interfere with the driving operation of the other.

[0106] As shown between FIGS. **10** and **11**, the height change assembly **350** is operable to load (i.e., preload) the energy storage device **390** without moving the upper post **336** relative to the lower post **338**. To move from the state in FIG. **10** to that in FIG. **11**, first the locking assembly **316** is controlled to lock the upper post **336** relative to the lower post **338** with the locking feature **317** extending through the upper post **336** and the lower post **338**, for example through corresponding ones of the locking passage **395**. With the upper and lower posts **336** and **338** locked together, the motor **310** then drives the carrier **387** and the tension device **389** connected thereto in the downward direction D along the longitudinal travel path L through operation of the output shaft **314**. The energy storage device **390** in turn compresses, storing energy for later release. Although the energy storage device **390** as shown is a coil spring, it should be appreciated that such a configuration could also be achieved with other types of energy storage, for example air springs.

[0107] The change between FIG. **10** and FIG. **11** may be effected automatically, for example responsive to arriving at the state of FIG. **10**. That is, the energy storage device **390** may be automatically preloaded such that release can be rapidly achieved when commanded by a rider. As shown with the change in state from FIG. **11** to FIG. **12**, this release may be achieved by unlocking the locking assembly **316**. As the energy storage device **390** is constrained relative to the lower post **338** through its energy storage device upper carrier **392**, unlocking in the raised and preloaded state shown in FIG. **11** results in driving of the upper post **336** in the downward direction D along the longitudinal travel path L, ending in the lowered and unloaded state shown in FIG. **12**.

[0108] Continuing to FIG. **12**, once this lowered and unloaded state is achieved (or while the upper post **336** is moving towards the lowered position), the locking assembly **316** may again lock (or prepare to lock), for example automatically, and the motor **310** may again operate to return to a preloaded state, for example automatically. To achieve the lowered and preloaded state shown in FIG. **13** from the lowered and unloaded state shown in FIG. **12**, the motor **310** is operable to drive the carrier **387** in the upward direction U along the longitudinal travel path L through operation of the output shaft **314**. The carrier stop(s) **388** drive the energy storage device lower carrier **391** in the upward direction U, thus loading the energy storage device **390** as the energy storage device upper carrier **392** is constrained against the energy storage device upper stop(s) and the locked upper post **336**. From this preloaded and lowered state, a command may be given to unlock the upper post **336** with the locking assembly **316**, sending the adjustable seatpost assembly **330** to the raised and unloaded state shown in FIG. **10**. As such, the adjustable seatpost assembly **330** can toggle between its raised and lowered positions with automatic preloading operations achieved therebetween. In some instances, the adjustable seatpost assembly **330** may be lockable in one or more intermediate positions between the raised and lowered positions, for example using an intermediate locking passage **395**.

[0109] As shown in FIG. **13**, the tension device **389** may be freely compressible to facilitate travel of the carrier **387** as needed. For example, the tension device **389** may be conceptualized as a cord or string, with strength in tension but flexibility in compression. In an embodiment, the tension device **389** may be configured as a collapsible bellows. The tension device **389** in such a bellows configuration may include one or more reinforcement cords, for example made out of a strong tensile material. Such a bellows configuration of the tension device **389** may additionally or alternatively include discrete tensile cords housed inside the tension device **389**.

[0110] Turning now to FIG. **14**, a schematic sectional view of an adjustable seatpost assembly **430** is shown in an extended position and unloaded state. The adjustable seatpost assembly **430** of FIG. **14** depicts a height change assembly **450** that is both drivable and loadable or pre-loadable, for example as described with reference to FIGS. **10-13** above. As in other embodiments, a lower post **438** is configured to mount to a bicycle frame and an upper post **436** includes a saddle support structure **434**. The saddle support structure **434** is generally configured to accept a bicycle seat or saddle and control its relative position to the upper post **436**. As shown, the saddle support structure **434** includes a saddle reference structure **435** fixed relative to the upper post **436**. For example, the saddle reference structure **435** may be integral to the upper post **436** and used to define a relationship between the attached saddle and the adjustable seatpost assembly **430**. Beyond the saddle reference structure **435**, a lower saddle clamp **437** and an upper saddle clamp **439** may be provided and fastened with one or more of a saddle clamp fastener **441**. This arrangement may be used to finely adjust and fix a desired angle and/or fore-aft position of the saddle (not shown) relative to the adjustable seatpost assembly **436**, for example by clamping to a set of saddle rails (not shown) fixed to the saddle (not shown).

[0111] In FIG. **14**, the height change assembly **450** is mounted or mountable on a bottom cap **480**, and specifically to a bottom cap inside surface **481**. The bottom cap **480** may be removable, for example threadably removable, to facilitate assembly, disassembly, and/or service. The height change assembly **450** shown may also be spaced apart from a lower post inner surface **471** of the lower post **438** and from an upper post inner surface **469** of the upper post **436**. This spaced apart configuration facilitates movement of the upper post **436** between at least a portion of the height change assembly **450** and the lower post inner surface **471** of the lower post **438** throughout the travel of the upper post **436**. As shown, the bottom cap **480** may provide control of one or more communication or transmission structures from an actuation device (not shown). Operation of the height change assembly **450** results in a driving force acting on the saddle support structure **434** through the upper post **436** in the upward direction U or the downward direction D along the longitudinal travel path L. The upper post **436** may be constrained along the longitudinal travel path L between upper and lower positions, for example by stop features provided on the lower post **438** and/or an endcap **482**. A sealing arrangement, for example as described above with reference to FIGS. **3-6** and **10-13** may be provided as a post seal assembly **484**, which may further be connected to or integrated with the endcap **482**.

[0112] Still referring to FIG. **14**, the height change assembly **450** is depicted as a motorized height change assembly. Accordingly, the height change assembly **450** includes a motor **410** controlled by a motor controller **411** and powered by a motor power source **412**. The motor **410** is operable to drive an output shaft **414**. The output shaft **414** is configurable to provide driving force to the adjustable seatpost assembly **430** through various structures. As shown in FIG. **14**, the output shaft **414** is configured to drive a carrier **487**. The carrier **487** as shown is operable to drive the upper post **436** relative to the lower post **438**. As described in greater detail below, the carrier **487** may be configured to drive an energy storage device **490** which in turn may selectively drive the upper post **436** upwards and downwards. Selective control of the energy storage device **490** may be achieved with a locking assembly **416**. As shown, the locking assembly **416** includes at least one locking feature **417** operable to lock the upper post **436** relative to the lower post **438**. As such, the locking assembly **416** facilitates preloading of the adjustable seatpost assembly **430** with the energy storage device **490** and releasing of preloaded energy from the energy storage device **490** with operation of the locking assembly **416**. As shown, the locking assembly **416** is configured to interact with one or more locking passages **495**. For example, the locking feature **417** may be sized and shaped to selectively insert into and retract from a first set of the locking passages **495** to lock the adjustable seatpost assembly **430** in the extended position and a second set of the locking passages **495** to lock the adjustable seatpost assembly **430** in the retracted position.

[0113] Communication to the height change assembly **450** may be effected through one or more communication features. As shown in FIG. **14**, an internal communication feature **418** may be provided on the lower post **438** for internal or stealth routing and/or an external communication feature **420** may be provided on the upper post **436**, an upper portion of the lower post **438**, or the endcap **482** as shown. The communication features **418**, **420** may generally accept routing of electrical conductors to send and/or receive signals and/or power between the adjustable seatpost assembly **430** and another component such as an actuation assembly shown in FIGS. **19**A and **19***b*.

[0114] As will be discussed in greater detail below with reference to FIGS. **14-17** and as generally described above with reference to FIGS. **10-13**, the motor **410** is configured to impart a driving force on the energy storage device **490** through the carrier **487** and a tension device **489**. The carrier **487** may facilitate driving energy into the energy storage device **490** for release in the upward direction U and the tension device **489** may facilitate driving energy into the energy storage device in the downward direction D. As shown in FIG. **14** with the energy storage device **490** in an unloaded state, an energy storage device lower carrier **491** maintains the energy storage device **490** above an energy storage device lower stop **493** fixed to the lower post **438**. Similarly, an energy storage device upper carrier **492** maintains the energy storage device below an energy storage device upper carrier **492**.

[0115] It should be appreciated that while the state in FIG. **14** is herein referred to as an unloaded state, the energy storage device **490** may still be under load. For example, a four-bar spring embodiment of the energy storage device **490** may be preloaded in this unloaded state between the energy storage device lower stop **493** and the energy storage device upper stop **494** while still not being actively loaded through operation of the motor **410**. Generally speaking, driving operation of the carrier **487** in the upward direction U drives a carrier stop **488** upwards into the energy storage device lower carrier **491** to move it off of the energy storage device lower stop **493** to store energy for a lifting operation. Driving operation of the tension device **489** in the downward direction D drives the energy storage device upper carrier **492** downwards to move it off of the energy storage device upper stop **494** to store energy for a lowering operation. As discussed in greater detail below, the tension device **489** and the carrier **492** are configured so as to not interfere with the driving operation of the other.

[0116] The embodiment of FIGS. **14-17** further includes a travel clearance **496** configured to facilitate travel of the upper seatpost **436**. As shown, the travel clearance **496** may be sized and shaped to allow easy travel of the upper seatpost **436** through its intermediate positions. In an embodiment, the travel clearance **496** is an integral recess to the lower post inner surface **471**. The travel clearance **496** is configured to not interfere with a stable lockup in the raised and lowered positions of the upper seatpost **436** while still facilitating a reduction in energy to move between the raised and lower positions. Although not shown in FIGS. **14-17**, the upper seatpost **436** may be configured with one or more corresponding travel features, such as wedge features, sized and shaped to interface with the travel clearance **496**. Such corresponding travel features could aid in lockup in the raised and lowered positions, for example by wedging into the upper and lower extreme portions of the travel clearance **496**.

[0117] As shown in FIG. **14**, the locking feature **417** of the locking assembly **416** may be controlled at least in part by the height change assembly **450**. Specifically, operation of the motor **410** may control unlocking and/or locking of the locking assembly **416**. In FIG. **14**, The locking assembly **416** is shown in a locked state with the locking features **417** extending through the locking passages **495** and locking the upper post **436** to the lower post **438**. As shown, the locking features **417** may be biased (i.e. spring loaded) towards this position as a default position. Such a configuration may be used to ensure a lock-safe operation. Although not shown in FIGS. **14-17**, further locking passages **495** may be provided corresponding to one or more intermediate positions between the raised and lowered positions, for example an intermediate safety catch position.

[0118] As shown in moving from FIG. **14** to FIG. **15**, downward driving of the tension device **489** may move one or more of an unlocking feature **497** into contact with the locking feature(s) **417**. The unlocking features **497** shown in FIGS. **14-17** may be integrated with or in addition to the energy storage device **490**. For example, the four-bar linkage configuration shown may be internally biased or sprung to act as an energy storage device **490** generally similar to that described with reference to FIGS. **10-13** above. Alternatively, the unlocking features **497** may be provided as shown or with another configuration, in conjunction with an energy storage device **390** as described with reference to FIGS. **10-13** above.

[0119] Returning to FIG. **15**, the state shown here may be described as a raised and preloaded state that has just been unlocked. It should be appreciated that the motor **410** may be controlled to automatically preload the energy storage device **490** to a point just prior to unlocking, such that an unlock command from a rider need only slightly add additional force to the energy storage device **490** to achieve unlocking and thus driving of the upper post downward to the lowered and unloaded state shown in FIG. **16**.

[0120] Turning to FIG. **16**, the state shown has been automatically locked by sprung action of the locking assembly **416**. As described above, the motor may automatically preload the energy storage device **490** with the carrier **487** moving in the upward direction U. Such preloading may be automatically stopped prior to full travel of the carrier **487**, thus not unlocking the locking assembly **416**. A user input may then be awaited, upon receipt of which full travel of the carrier **487** may be achieved with the motor **410**, slightly increasing preload and unlocking the locking assembly **416**, as shown in the instant state of FIG. **17** to then return to the state shown in FIG. **14**.

[0121] Turning now to FIG. **18***a*, a schematic view of a mechanical actuation assembly **710** is provided. The actuation assembly **710** shown is mountable to a handlebar **725**, for example about a handlebar axis H with a handlebar clamp **767**. As shown, the mechanical actuation assembly **710** includes an actuator **712** for user operation, shown here in a lever configuration. The actuator **712** includes a user interface **768**, for example a thumb paddle, configured to receive a user input. In FIG. **18***a*, the actuator **712** is shown in a first position or a rest position while in FIG. **18***b* the actuator **712** is shown in a second position or an actuated position. As described above with reference to FIGS. **3-6**, actuation of a cable **758** may in turn operate a height change mechanism as discussed with reference to those embodiments. As shown in FIGS. **18**A and **18***b*, the cable **758** may generally be described as part of a Bowden cable system. Specifically, the cable **758** is received in the actuation assembly **710** through an actuator housing stop **762** and a cable guide **759**. The actuator housing stop **762** is operable to receive a cable housing **760**, for example the same cable housing used in one of the embodiments of FIGS. **3-6**.

[0122] Referring still to FIGS. **18**A and **18***b*, the cable **758** may be controlled relative to the actuator housing stop **762** mounted to an actuator body **761**. By controlling the length of the cable **758** between the actuator housing stop **762** and a cable fastener **765**, a length on the other end of the cable housing **760**, for example at a height change assembly, may in turn be controlled. Operation of the actuator **712** increases the effective length of the cable **758** between the actuator housing stop **762** and the cable fastener **765** by the difference shown in the first cable wrap distance B (FIG. **18***a*) and the second cable wrap distance BB (FIG. **18***b*). The change in cable wrap distance is effected by an actuator pulley **763** rotatable about an actuation axis and fixed with a pulley fastener **764**.

[0123] As described above with reference to FIGS. **18***a* and **18***b*, the actuator **712** is movable between at least its rest position and its actuated position. When viewed in combination with the embodiments of the height change assembly in FIGS. **3-6**, it should be appreciated that movement of the actuator **712** from the rest position to the actuated position may thus operate a height change mechanism to drive an adjustable seatpost assembly from its retracted position to its extended position and from its extended position to its retracted position. As described above, the actuator **712** thus transmits a mechanical force to an associated height change assembly, which in turn transmits a mechanical force to a seatpost.

[0124] FIGS. **19***a* and **19***b* show schematic views of an electrical actuation assembly **810**. As shown in FIGS. **19***a* and **19***b*, the electrical actuation assembly **810** generally includes an actuator **812** and an actuator body **861**, where the actuator **812** is movable relative to the actuator body **861**. The actuator body **861** is mountable to a bicycle, for example to a handlebar assembly (not shown) by clamping an actuator first body portion **862** to an actuator second body portion **863** about a handlebar axis H with an actuator fastener **867**. Operation of the actuator **812** may be performed by a user or rider with the user interface **868**, for example in a thumb paddle configuration. It should be appreciated that the actuation assembly **810** described herein is exemplary and may include any number of variations of buttons, levers, or switches operable to transmit a user input.

[0125] Between FIGS. **19***a* and **19***b*, the actuator **812** is movable between the rest position in FIG. **19***a* and the actuated position in **19***b*. Movement to the actuated position may be operable to transmit a user input signal, for example to a height change assembly as described above. Such a user input signal may be operable to toggle between extended and retracted positions of such a height change assembly. In an embodiment, further actuators (not shown) may be provided, for example to discretely control upward movement and downward movement and/or to operate a preloading function, for example as discussed with reference to FIGS. **10-17**. As shown, it should be appreciated that such a preloading function may be automatic, facilitating simple use of the actuator to generate an input signal. In an embodiment, such an input signal would trigger driving of a seatpost to an upper position from a lower position or from the lower position to the upper position, depending on the position from which the seatpost starts.

[0126] Still referring to FIGS. **19***a* and **19***b*, the first position shown in FIG. **19***a* may be described with reference to a reference line R generally aligned with the longitudinal travel path L. The rest position shown in FIG. **19***a* is defined with a first position reference R**1** relative to this reference line R and passing through the actuator **812**. The actuated position shown in FIG. **19***b* is defined with a second position reference R**2** relative to the reference line R and similarly passing through the actuator **812**. As shown between these depictions, the second reference position defines a second angle A**2** with the reference line R which is greater than a first angle A**1** defined with the first position reference R**1** and the reference line R. The difference in the first angle A**1** and the second angle A**2** defines an actuation angle. Relative to the mechanical actuation assembly **710**, the actuation angle of the electrical actuation assembly **810** described herein may be relatively small, facilitating easy operation.

[0127] As shown in FIGS. **19***a* and **19***b*, an actuator power source **814** may be provided. Additionally or alternatively, the actuation assembly **810** may use power from another source, such as a power source as described with reference to FIGS. **10-17** above. A power source could be integrated with another component such as a propulsion power source in an e-bike. Additionally or alternatively, the actuation assembly **810** or other components could draw power from a generator such as a dynamo driven by a wheel or another component. It should be appreciated that a single power source may be used for multiple components or that multiple power sources may provide redundancy for a single component.

[0128] Turning now to FIG. **20**, a flow chart depicts a method of positioning a seatpost between a plurality of states. The method described herein generally includes receiving a first input (**2001**). In (**2001**), the receiving may be performed by a height change assembly of the seatpost, for example at a motor controller of a height change assembly as described above with reference to FIGS. **10-17**. It should also be appreciated that the receiving may be performed by a mechanical component of a height change assembly, for example a driving wheel as described with reference to FIGS. **3-9**. The method further includes causing the seatpost to move from an extended state to a retracted state (**2002**). In (**2002**), the seatpost may be moved by any embodiment of a height change assembly as described herein above, for example a mechanical, electrical, or electromechanical embodiment of a height change assembly. This operation (**2002**) generally is responsive to receiving the first input at (**2001**). The method further includes receiving a second input (**2003**). As with receiving the first input (**2001**), receiving the second input (**2003**) is generally downstream of an actuation assembly. For example, a mechanical or electrical actuation assembly may transmit a force or signal to be received in (**2003**). The method further includes causing the seatpost to move from the retracted state to the extended state (**2004**). This operation (**2004**) generally is responsive to receiving the second input at (**2003**). In (**2004**), the seatpost may be moved by any embodiment of a height change assembly as described herein above, for example a mechanical, electrical, or electromechanical embodiment of a height change assembly.

[0129] The method of FIG. **20** may further include features such as locking, with a locking assembly, the seatpost in the extended state. For example a discrete locking assembly may actively lock the seatpost or the seatpost may be locked with an automatically-locking arrangement, each as generally described above with reference to the various embodiments. Locking may additionally or alternatively be achieved in the retracted state of the seatpost in similar manners. It should also be appreciated that different locking assemblies and/or members may be used to lock in the extended and retracted states.

[0130] Turning now to FIG. **21**, a flow chart depicts a method of configuring a seatpost assembly between a plurality of states. The method described herein generally includes causing the seatpost to move from an extended state to a retracted state responsive to a first input (**2101**). In (**2101**), a height change assembly as generally described above may be operable to move the seatpost responsive to the first input. The method further includes causing the seatpost to move from the retracted state to the extended state responsive to a second input (**2102**). In (**2102**), the same height change assembly as in (**2101**) may generally be employed. The second input in (**2102**) may be the same or different to the first input in (**2101**). For example, the first input and the second input may be the same electrical input (i.e. a same button press) or the same mechanical input (i.e. a cable pull). The method may be repeated indefinitely prior to a servicing operation (**2103**). In (**2103**), the method may be repeated any number of times, but specifically is not dependent on energy discharge to determine an amount of repeatability. For example, (2103) may be achieved by using a mechanical input from a user or through generator or dynamo arrangement with an electrical system. It should be appreciated that (2103) may be further expanded and defined by facilitating that the seatpost is movable by the height change assembly between the extended state and the retracted state at least 100, 200, 500, 1000, or 10,000 times prior to the servicing operation.

[0131] Turning now to FIG. **22**, a flow chart depicts a method of positioning a seatpost assembly between a plurality of states. The method described herein generally includes storing energy from a height change assembly (**2201**). In (**2201**), the energy may be stored with an energy storage device such as any of those described in relation to FIGS. **10-17**. The method further includes releasing stored energy (**2202**). In (**2202**), the releasing may be performed with a locking assembly, for example as described with reference to FIGS. **10-17** above. Such release may allow release of the energy stored or preloaded within the energy storage device. The method further includes storing energy from the height change assembly responsive to the releasing of the stored energy (**2203**). That is, in (**2203**), energy is stored responsive to the release in (**2202**). As described with reference to FIGS. **10-17** above, (**2203**) may be achieved automatically as a preloading function of the energy storage device.

[0132] Still referring to FIG. **22**, the method described herein may further include locking, with a locking assembly, the seatpost in an extended position responsive to the releasing of (**2202**). Such locking may facilitate reloading/preloading of the energy storage device as described with reference to FIGS. **10-17** above. Furthermore, one or more sensors, such as those described above and including motor sensors such as in a stepper motor, or sensors integral to a motor controller may be provided. For example, a sensor may be used to detect energy stored with the energy storage device. This detection may be achieved directly or indirectly, for example through motor force detection and calculation using known properties of the energy storage device (i.e. spring constant, preload force, etc.). A processor, such as in a motor controller, may then be used to determine if the energy storage device has achieved a threshold. For example, the processor may detect if the energy storage device has sufficient energy to reach a next actuation position (i.e. an extended position or a retracted position). The threshold may be predetermined and may be variable, for example based on past detections of complete or incomplete actuation or of environmental conditions such as temperature or contamination. If the processor determines that the threshold has been achieved, the processor may proceed to generating a ready signal. This ready signal may be displayed to a rider, for example through a light or audio indicator. If the processor determines that the threshold has not been achieved, the processor may refuse releasing (i.e. not send an actuation signal responsive to a user input) the energy stored in the energy storage device.

[0133] Terms such as “processor” and “motor controller” as used herein can include any suitable processing device (e.g., a control circuitry, a processor core, a microprocessor, an application specific integrated circuit, a field programmable gate array, a controller, a microcontroller, etc.) and can be one processor or a plurality of processors that are operatively connected. The processor can be in communication with a memory. The memory can include one or more non-transitory computer-readable storage media, such as RAM, ROM, EEPROM, EPROM, one or more memory devices, flash memory devices, etc., and combinations thereof. The memory can store information that can be accessed by the processor(s). For instance, the memory (e.g., one or more non-transitory computer-readable storage mediums, memory devices) can include computer-readable instructions that can be executed by the processor(s). The instructions can be software, firmware, or both written in any suitable programming language or can be implemented in firmware or hardware. Additionally or alternatively, the instructions can be executed in logically and/or virtually separate threads on processor(s). For example, the memory can store instructions that when executed by the processor(s) cause the processor(s) to perform operations such as any of the operations and functions as described herein.

[0134] The processor(s) may be in communication with a remote server, for example via an onboard wireless communication device, such as a transceiver. The wireless communication device can wirelessly communicate using any reliable method including, for example, WiFi, WIMAX, LTR, BLUETOOTH, or other proprietary or public wireless communication methods. The remote server can transmit instructions to the processor(s) that cause performance of one or more operations. For example, the remote server can cause the processor(s) to update the instructions stored in memory. The remote server may also communicate with the processor(s) to detect, and optionally adjust, performance of the adjustable seatpost assembly. In some instances, the remote server can store information associated with the adjustable seatpost assembly. For example, the remote server can store information relating to system health, battery life, motor performance, use frequency, etc., for example, to provide better user experience.

[0135] In an embodiment, the adjustable seatpost assembly may be controllable and/or tunable by a mobile computing device (such as a smartphone, tablet, or laptop). The remote server and/or processor(s) of the adjustable seatpost assembly may communicate with the mobile computing device. The rider can access information associated with the adjustable seatpost assembly from the mobile computing device and/or adjust one or more settings of the adjustable seatpost assembly using the mobile computing device. For instance, the mobile computing device can include an application that interfaces with the adjustable seatpost assembly (directly or indirectly, e.g., through the remote server). The rider can tune the adjustable seatpost assembly using the application associated with the mobile computing device. For example, in motorized embodiments, the user may adjust between a maximum performance mode and a battery saving mode, or even adjust preload settings and/or locking characteristics. In maximum performance mode, the motor may operate at higher power outputs, allowing for faster preload. Conversely, in battery saving mode, the motor may operate at lower power outputs with slower preload capability but prolonged operational use. Yet other variably adjustable configurations and characteristics may be selectively tuned by the rider prior to or during a ride. The rider may toggle between modes in view of terrain, ride duration, remaining charge, or the like. In some instances, the adjustable seatpost assembly may include a user interface, such as one or more buttons or toggles, through which the rider can interact with the motor controller. For example, the rider may toggle between different operational modes, or even lockout the adjustable seatpost assembly on demand. In some embodiments, the rider may enter an autonomous (or semi-autonomous) mode whereby the motor controller adjusts saddle height using predictive analysis based on riding data (e.g. accelerometer terrain data). In other instances, the rider may rely on a manual control mode, e.g., using the actuation assembly.

[0136] In an embodiment, the rider may access information regarding the adjustable seatpost assembly, e.g., using the remote computing device. For example, the memory of the motor controller can store information associated with the adjustable seatpost assembly. The information can be communicated to the remote computing device to be accessed by the rider. Certain information can be geolocated, or tagged, with coordinates (or other location discerning information) where an action occurred. For example, the rider may be able to access a map upon which information associated with actuation of the adjustable seatpost assembly is overlaid. This actuation information may allow the rider to review their ride or even update instructions for use of the adjustable seatpost assembly for future rides. For example, the rider may cause the adjustable seatpost assembly to actuate similarly, or the same, on future rides, by saving and implementing actuation information associated with one or more previous rides. The rider may also adjust the information for the future ride based on review of the previous ride(s) (e.g., to actuate the adjustable seatpost assembly sooner at technical parts of the travel environment). In this regard, use of the adjustable seatpost assembly may also be hands free when the user has already input instructions for actuation. It should be understood that the rider may also input instructions for actuations ahead of riding a trail for the first time. For example, the rider can select one or more locations along a trail using the mobile computing device. The rider can associate these one or more locations with actuation of the adjustable seatpost assembly such that the adjustable seatpost assembly automatically actuates when the location of the bicycle is detected at the one or more locations. Of course, the rider can further implement control of the adjustable seatpost assembly using the actuation assembly.

[0137] The motor power source may have a finite energy storage capacity, limiting use of the adjustable seatpost assembly to a predefined number of actuations (i.e., between the raised and lower positions). To avoid range anxiety, a user notification device may be provided to notify the rider of remaining actuation capacity. The user notification device can include a digital display, such as an LCD, LED, or OLED screen; an analog display, such as a physical dial, a speaker or other audible notification system, or the like. The user notification device can provide the rider with information associated with remaining actuation capacity. For example, the user notification device can provide an estimated number of remaining actuations prior to depletion of energy at the motor power source, a percentage of remaining charge at the motor power source, a color indicative of remaining charge (e.g., dark green for full charge, dark red for empty, and other color(s) therebetween to indicate intermediate charge levels), or the like. In an embodiment, the user notification device can generate a user warning (e.g., a tactile warning, an audible warning, a visual warning, etc.) when the remaining charge at the motor power source falls below a predetermined threshold. This predetermined threshold may be adjustable, such as for example, at the application executed by the mobile computing device. For implementations where the motor power source is charged in situ, the user notification device can further provide information associated with remaining charge time, system health, or the like during charging. The user notification device can be positioned at a location along the bicycle where the rider can easily detect the provided information. For example, the user notification device can be coupled to the handlebar (for example, at the actuation assembly) or at a stem of the bicycle. The user notification device may be powered by a separate power source, the actuator power source, the motor power source, an onboard power source (in the case of an e-bike), or a combination thereof.

[0138] The motor power source may, from time to time, deplete before the rider completes a ride (particularly when the rider forgets to recharge the motor power source after a previous ride). In such instances, the adjustable seatpost assembly may be reconfigurable to a non-actuatable mode where the rider can manually adjust saddle height and lock the adjustable seatpost assembly in the adjusted saddle height. In an embodiment, the non-actuatable mode may be entered into even when the motor power source has sufficient remaining charge to actuate the adjustable seatpost assembly by the user manually moving the upper post of the adjustable seatpost assembly.

[0139] Some riders prefer the use of saddle bags that attach to structural aspects of the seatpost or saddle. Embodiments described herein may physically accommodate the use of such saddle bags. Moreover, embodiments described herein may allow the rider to tune the adjustable seatpost assembly to counteract the effects of gravity on the saddle bag and restore neutral buoyancy to the adjustable seatpost assembly. For example, the rider can add a biasing element, like a coil or torsional spring, that biases the adjustable seatpost assembly to the raised position to overcome downward force from the saddle bag.

[0140] It should be understood that adjustable seatpost assemblies in accordance with some embodiments herein may be stored with preloaded energy when the bicycle is not actively in use. Storage of preload may prematurely wear or exhaust components of the adjustable seatpost assembly. Accordingly, the adjustable seatpost assembly (e.g., processor(s) associated with the adjustable seatpost assembly) may be configured to release stored energy under certain conditions, such as when the bicycle is detected in a stationary position for a predetermined duration of time. The rider can select the predetermined duration of time, or even disengage the automatic release of stored energy, for example using the mobile computing device. In an embodiment, release of stored energy may be gradual to prevent the seatpost from moving from an existing position to another position. For example, the motor controller may release preload by gradually unloading energy stored in the energy storage device. The motor controller can store instructions which, when executed, cause the motor to perform this gradual unloading to reconfigure the adjustable seatpost assembly to the unloaded position.

[0141] The adjustable seatpost assemblies and other assemblies described herein may be provided with any of the features and elements as shown and described. The illustrations of the embodiments described herein are intended to provide a general understanding of the structure of the various embodiments. The illustrations are not intended to serve as a complete description of all of the elements and features of apparatus and systems that utilize the structures or methods described herein. Many other embodiments may be apparent to those of skill in the art upon reviewing the disclosure. Other embodiments may be utilized and derived from the disclosure, such that structural and logical substitutions and changes may be made without departing from the scope of the disclosure. Additionally, the illustrations are merely representational and may not be drawn to scale. Certain proportions within the illustrations may be exaggerated, while other proportions may be minimized. Accordingly, the disclosure and the figures are to be regarded as illustrative rather than restrictive.

[0142] Further aspects of the disclosure are provided by one or more of the following embodiments:

[0143] Embodiment 1. A seatpost assembly comprising: a lower post; an upper post movable relative to the lower post between a high position and a low position; an actuation assembly configured to receive a user input; and a height change assembly operable to drive the upper post to the high position responsive to receiving the user input and to drive the upper post to the low position responsive to receiving the user input.

[0144] Embodiment 2. The seatpost assembly of embodiment 1, wherein the actuation assembly comprises an input device, and wherein the user input is generated by operating the input device.

[0145] Embodiment 3. The seatpost assembly of embodiment 2, wherein the input device comprises a mechanical lever.

[0146] Embodiment 4. The seatpost assembly of embodiment 2, wherein the input device comprises an electrical switch.

[0147] Embodiment 5. The seatpost assembly of any one or more of embodiments 1 to 4, wherein the user input is the same to drive the upper post to the high position and to drive the upper post to the lower position.

[0148] Embodiment 6. The seatpost assembly of any one or more of embodiments 1 to 5, wherein the actuation assembly is configured to transmit an actuation signal responsive to the user input, wherein the height change assembly is configured to receive the actuation signal, and wherein the height change assembly is configured to toggle between the high position and the low position responsive to receiving the actuation signal.

[0149] Embodiment 7. The seatpost assembly of any one or more of embodiments 1 to 6, wherein the upper post comprises a saddle support structure sized and shaped to receive a saddle, and wherein the saddle support structure is movable relative to the lower post with the upper post at the high position.

[0150] Embodiment 8. The seatpost assembly of embodiment 7, wherein the saddle support structure is movable relative to the lower post with the upper post at the low position.

[0151] Embodiment 9. The seatpost assembly of embodiment 7, wherein the saddle support structure is movable relative to the lower post in a direction along an axial length of the upper post.

[0152] Embodiment 10. The seatpost assembly of any one or more of embodiments 1 to 9, further comprising a locking assembly configured to lock the upper post at the high position.

[0153] Embodiment 11. The seatpost assembly of embodiment 10, wherein the locking assembly is further configured to lock the upper post at the low position.

[0154] Embodiment 12. The seatpost assembly of embodiment 10, wherein the locking assembly comprises a first locking structure configured to selectively lock the upper post at the high position, and wherein the locking assembly comprises a second locking structure configured to selectively lock the upper post at the low position.

[0155] Embodiment 13. The seatpost assembly of embodiment 10, wherein the locking assembly, responsive to receiving a locking input, toggles the locking assembly between a locked state and an unlocked state.
[0156] Embodiment 14. The seatpost assembly of embodiment 13, wherein the locking input is generated by the user input.
[0157] Embodiment 15. The seatpost assembly of any one or more of embodiments 1 to 14, wherein the height change assembly comprises: a first arm coupled to the upper post; and a second arm coupled to the lower post.
[0158] Embodiment 16. The seatpost assembly of embodiment 15, further comprising a spring biasing the first and second arms relative to one another.
[0159] Embodiment 17. The seatpost assembly of embodiment 16, wherein the first and second arms are rotatably coupled together at a rotational axis, and wherein the spring rotatably biases the first and second arms relative to one another at the rotational axis.
[0160] Embodiment 18. The seatpost assembly of embodiment 15, wherein the first arm is rotatably coupled to the second arm about a rotational axis.
[0161] Embodiment 19. The seatpost assembly of embodiment 18, wherein the rotational axis is oriented orthogonally to a longitudinal axis of the lower post.
[0162] Embodiment 20. The seatpost assembly of embodiment 15, wherein the first arm is configured to rotate relative to the upper post responsive to rotation of the second arm relative to the lower post.
[0163] Embodiment 21. The seatpost assembly of embodiment 15, further comprising a third arm rotatably coupled to at least one of the first arm or the second arm, the third arm rotatable responsive to rotation of the second arm relative to the lower post.
[0164] Embodiment 22. The seatpost assembly of embodiment 15, wherein the first arm is disposed at a first angle, as measured with respect to a longitudinal axis of the lower post, when the upper post is at the high position, wherein the first arm is disposed at a second angle, as measured with respect to the longitudinal axis, when the upper post is at the low position, and wherein the first and second angles are different from one another.
[0165] Embodiment 23. The seatpost assembly of embodiment 22, wherein the first angle is less than the second angle.
[0166] Embodiment 24. The seatpost assembly of embodiment 15, wherein the height change assembly further comprises a rotatable element rotatably driven responsive to the user input, and wherein the second arm is operably coupled to the rotatable element such that the height change assembly drives the upper post responsive to rotation of the rotatable element.
[0167] Embodiment 25. The seatpost assembly of embodiment 24, wherein the rotatable element comprises a motor shaft.
[0168] Embodiment 26. The seatpost assembly of embodiment 24, wherein receipt of the user input by the actuation assembly causes displacement of a cable, and wherein the cable is mechanically coupled to the rotatable element.
[0169] Embodiment 27. The seatpost assembly of embodiment 24, wherein the rotatable element comprises a first stop feature and a second stop feature, wherein the second arm is engaged with the first stop feature when the upper post is in the high position, and wherein the second arm is engaged with the second stop feature when the upper post is in the low position.
[0170] Embodiment 28. The seatpost assembly of embodiment 27, wherein the first and second stop features are operably coupled together by a surface, and wherein an interfacing portion of the second arm is configured to translate along the surface to move between the first and second stop features.
[0171] Embodiment 29. The seatpost assembly of embodiment 15, wherein the first and second arms are coupled together by a plurality of intermediate arms.
[0172] Embodiment 30. The seatpost assembly of embodiment 29, wherein the plurality of

intermediate arms are arranged in sets, each set including two of the plurality of intermediate arms, and wherein the sets together form a scissor linkage.
[0173] Embodiment 31. The seatpost assembly of embodiment 29, wherein each of the plurality of intermediate arms is identical.
[0174] Embodiment 32. The seatpost assembly of any one or more of embodiments 1 to 31, wherein the height change assembly is essentially free of a pressure vessel.
[0175] Embodiment 33. The seatpost assembly of any one or more of embodiments 1 to 32, wherein the upper post is movable by the height change assembly from the high position to the low position indefinitely prior to a servicing operation.
[0176] Embodiment 34. The seatpost assembly of any one or more of embodiments 1 to 33, wherein the height change assembly is disposed entirely within a volume defined by the upper and lower posts.
[0177] Embodiment 35. The seatpost assembly of any one or more of embodiments 1 to 34, wherein the upper post has a first cross-sectional shape, wherein the lower post has a second cross-sectional shape, and wherein the first and second cross-sectional shapes are different from one another.
[0178] Embodiment 36. The seatpost assembly of any one or more of embodiments 1 to 35, wherein the lower post has a non-circular cross-sectional shape.
[0179] Embodiment 37. The seatpost assembly of any one or more of embodiments 1 to 36, wherein the upper post is configured to receive a saddle, and wherein an angle of the saddle, as measured with respect to a longitudinal axis of the lower post, is the same with the upper post in the high position and the low position.
[0180] Embodiment 38. The seatpost assembly of any one or more of embodiments 1 to 37, wherein the actuation assembly is configured to wirelessly transmit a signal responsive to the user input.
[0181] Embodiment 39. The seatpost assembly of any one or more of embodiments 1 to 38, further comprising a clutch operably disposed between the actuation assembly and the height change assembly, wherein the clutch is configured to slip at a threshold condition.
[0182] Embodiment 40. The seatpost assembly of embodiment 39, wherein the threshold condition is defined at least in part by a threshold force.
[0183] Embodiment 41. The seatpost assembly of any one or more of embodiments 1 to 40, wherein the actuation assembly is coupled to the height change assembly by a cable, and wherein the seatpost assembly comprises a plurality of cable routing pathways, each of the plurality of cable routing pathways defining a different route for routing the cable between the actuation assembly and the height change assembly.
[0184] Embodiment 42. The seatpost assembly of any one or more of embodiments 1 to 41, wherein the height change assembly is directly driven by the actuation assembly.
[0185] Embodiment 43. The seatpost assembly of any one or more of embodiments 1 to 42, wherein the user input received at the actuation assembly has a first force profile, wherein the user input causes the height change assembly to have a second force profile, and wherein the first force profile and the second force profile have a fixed relationship relative to one another.
[0186] Embodiment 44. The seatpost assembly of any one or more of embodiments 1 to 43, further comprising an endcap removably coupled to the lower post, the endcap configured to restrain movement of the upper post in the high position, wherein the upper post is removable from the lower post directly after uncoupling the endcap from the lower post.
[0187] Embodiment 45. The seatpost assembly of embodiment 44, wherein the endcap is threadably coupled to the lower post.
[0188] Embodiment 46. The seatpost assembly of embodiment 44, wherein removing the upper post from the lower post causes a disconnection at the height change assembly, the disconnection permitting removal of the upper post from the lower post.

[0189] Embodiment 47. The seatpost assembly of any one or more of embodiments 1 to 46, wherein the height change assembly is serviceable when the lower post is disposed in a seat tube of a bicycle.
[0190] Embodiment 48. The seatpost assembly of any one or more of embodiments 1 to 47, further comprising a seal, a lubricant, a scraper, a spring, or any combination thereof disposed circumferentially about the upper post.
[0191] Embodiment 49. The seatpost assembly of any one or more of embodiments 1 to 48, wherein the height change assembly comprises: a motor having an output shaft to drive the upper post, wherein the output shaft is disposed in the lower post; and a power source electrically coupled to the motor.
[0192] Embodiment 50. The seatpost assembly of embodiment 49, wherein the upper post operably supports the power source.
[0193] Embodiment 51. The seatpost assembly of any one or more of embodiments 1 to 50, wherein the seatpost assembly is movable to a service position in which an upper access opening of the upper post and a lower access opening of the lower post align and through which at least one connection between the upper post and the lower post is controllable.
[0194] Embodiment 52. The seatpost assembly of any one or more of embodiments 1 to 51, wherein the upper post is rotationally keyed to the lower post.
[0195] Embodiment 53. The seatpost assembly of any one or more of embodiments 1 to 52, further comprising an energy storage device, the energy storage device operable to: store energy generated by the height change assembly; release stored energy to drive the upper post to the high position responsive to receiving the user input; and release stored energy to drive the upper post to the low position responsive to receiving the user input.
[0196] Embodiment 54. The seatpost assembly of embodiment 53, wherein the energy storage device comprises a spring.
[0197] Embodiment 55. The seatpost assembly of embodiment 53, wherein the energy storage device comprises: a first energy storage unit configured to store energy from movement of the height change assembly in a first height change direction and operable to release that stored energy to drive the upper post to the high position responsive to receiving the user input; and a second energy storage unit configured to store energy from movement of the height change assembly in a second height change direction, different from the first height change direction, and operable to release that stored energy to drive the upper post to the low position responsive to receiving the user input.
[0198] Embodiment 56. The seatpost assembly of embodiment 53, wherein the energy storage device comprises an energy storage unit, wherein the height change assembly is operable to drive the energy storage unit in: a first direction to store a stored lifting energy; and a second direction, different to the first direction, to store a lowering energy; wherein the stored lifting energy is released to drive the upper post to the high position responsive to receiving the user input; and wherein the stored lowering energy is released to drive the upper post to the low position responsive to receiving the user input.
[0199] Embodiment 57. The seatpost assembly of embodiment 56, further comprising a locking assembly, wherein release of the stored lifting energy and the stored lowering energy is controlled by the locking assembly.
[0200] Embodiment 58. The seatpost assembly of embodiment 57, wherein the locking assembly is controlled at least in part by the height change assembly.
[0201] Embodiment 59. The seatpost assembly of embodiment 58, wherein the locking assembly is integrated with the height change assembly.
[0202] Embodiment 60. A seatpost assembly comprising: a seatpost comprising an upper post and a lower post, wherein the upper post is moveable relative to the lower post between a retracted position and an extended position; and a height change assembly coupled between the upper post

and the lower post; wherein the height change assembly selectively drives the upper post from the extended position to the retracted position; and wherein the height change assembly selectively drives the upper post from the retracted position to the extended position.

[0203] Embodiment 61. The seatpost assembly of embodiment 60, further comprising: an actuation assembly, the actuation assembly comprising an actuator operable to cause the height change assembly to selectively drive the upper post: from the extended position to the retracted position; and from the retracted position to the extended position.

[0204] Embodiment 62. The seatpost assembly of any one or more of embodiments 60 or 61, further comprising an energy storage device, the energy storage device operable to: store energy generated by the height change assembly; release stored energy to selectively drive the upper post from the retracted position to the extended position; and release stored energy to selectively drive the upper post to the extended position to the retracted position.

[0205] Embodiment 63. The seatpost assembly of embodiment 62, wherein the energy storage device comprises a spring.

[0206] Embodiment 64. The seatpost assembly of embodiment 62, wherein the energy storage device comprises: a first energy storage unit configured to store energy from movement of the height change assembly in a first height change direction and operable to release that stored energy to selectively drive the upper post to the retracted position to the extended position; and a second energy storage unit configured to store energy from movement of the height change assembly in a second height change direction, different from the first height change direction, and operable to release that stored energy to selectively drive the upper post from the extended position to the retracted position.

[0207] Embodiment 65. The seatpost assembly of embodiment 62, wherein the energy storage device comprises an energy storage unit, wherein the height change assembly is operable to drive the energy storage unit in: a first direction to store a stored lifting energy; and a second direction, different to the first direction, to store a lowering energy; wherein the stored lifting energy is released to selectively drive the upper post from the retracted position to the extended position; and wherein the stored lowering energy is released to selectively drive the upper post from the extended position to the retracted position.

[0208] Embodiment 66. The seatpost assembly of embodiment 65, further comprising a locking assembly, wherein release of the stored lifting energy and the stored lowering energy is controlled by the locking assembly.

[0209] Embodiment 67. The seatpost assembly of embodiment 66, wherein the locking assembly is controlled at least in part by the height change assembly.

[0210] Embodiment 68. The seatpost assembly of embodiment 67, wherein the locking assembly is integrated with the height change assembly.

[0211] Embodiment 69. A seatpost assembly comprising: a lower post; an upper post movable relative to the lower post between a high position and a low position; and a height change assembly comprising a motor configured to drive the upper post between the high position and the low position.

[0212] Embodiment 70. The seatpost assembly of embodiment 69, wherein the motor is coupled to the upper post through an energy storage device.

[0213] Embodiment 71. The seatpost assembly of embodiment 70, wherein the energy storage device is configured to: store energy generated by the motor; and release the stored energy to drive the upper post from a current position of the high and low positions to the other of the high and low positions.

[0214] Embodiment 72. The seatpost assembly of embodiment 71, wherein the stored energy is mechanically stored by a linear spring, a rotational spring, or a combination thereof.

[0215] Embodiment 73. The seatpost assembly of embodiment 71, wherein the energy storage device is configured to store a prescribed threshold amount of stored energy received from the

motor.
[0216] Embodiment 74. The seatpost assembly of embodiment 73, wherein the energy storage device is configured to dissipate excess energy received from the motor after the energy storage device reaches the prescribed threshold of stored energy.
[0217] Embodiment 75. The seatpost assembly of embodiment 70, wherein the motor is configured to impart energy to the energy storage device in response to receiving a signal from an actuation assembly configured to receive a user input.
[0218] Embodiment 76. The seatpost assembly of embodiment 70, further comprising: an actuation assembly configured to receive a user input; and a locking assembly configured to lock the upper and lower posts in the upper position; wherein, responsive to receiving the user input, the actuation assembly controls: the locking assembly to unlock the upper and lower posts; the locking assembly to re-lock the upper and lower posts; and the motor to impart energy to recharge the energy storage device.
[0219] Embodiment 77. The seatpost assembly of any one or more of embodiments 69 to 76, wherein the motor is coupled to a power source, and wherein the power source is disposed at least partially within at least one of the upper or lower posts.
[0220] Embodiment 78. The seatpost assembly of embodiment 77, further comprising an actuation assembly configured to receive a user input, the user input operable to control the height change assembly, wherein the power source comprises: a first power unit disposed at least partially within at least one of the upper or lower posts; and a second power unit associated with the actuation assembly and disposed entirely outside of the upper and lower posts.
[0221] Embodiment 79. The seatpost assembly of embodiment 78, wherein the actuation assembly and the height change assembly communicate through an electrical conductor.
[0222] Embodiment 80. The seatpost assembly of any one or more of embodiments 69 to 79, wherein at least a portion of the motor is disposed outside at least one of the upper and lower posts when the upper post is in the lower position.
[0223] Embodiment 81. A seatpost assembly comprising: a seatpost positionable between an extended state and a retracted state; and an actuation assembly comprising an actuator, the actuator operably coupled to the seatpost, the actuator movable between a first position and a second position; wherein the seatpost moves from the extended state to the retracted state responsive to the actuator moving from the first position to the second position, and wherein the seatpost moves from the retracted state to the extended state responsive to the actuator moving from the first position to the second position.
[0224] Embodiment 82. The seatpost assembly of embodiment 81, wherein operation of the actuator provides the motive force to move the seatpost: from the extended state to the retracted state responsive to the actuator moving from the first position to the second position, and from the retracted state to the extended state responsive to the actuator moving from the first position to the second position.
[0225] Embodiment 83. The seatpost assembly of any one or more of embodiments 81 or 82, further comprising a height change assembly, wherein the height change assembly is configured to transmit motive force to move the seatpost: from the extended state to the retracted state responsive to the actuator moving from the first position to the second position, and from the retracted state to the extended state responsive to the actuator moving from the first position to the second position.
[0226] Embodiment 84. The seatpost assembly of embodiment 83, wherein the height change assembly is configured to transmit a mechanical force from the actuator to the seatpost.
[0227] Embodiment 85. The seatpost assembly of embodiment 83, wherein the height change assembly comprises: an electromechanical drive; and a power source; wherein the electromechanical drive is configured to use power from the power source to apply a mechanical force to the seatpost responsive to operation of the actuator.
[0228] Embodiment 86. The seatpost assembly of embodiment 85, wherein the power source is

removable from the seatpost.
[0229] Embodiment 87. The seatpost assembly of embodiment 85, wherein the actuation assembly further comprises a wireless transmitter and wherein the height change assembly further comprises a wireless receiver, the wireless receiver of the height change assembly configured to generate an operation signal responsive to receiving an actuation signal from the wireless transmitter of the actuation assembly.
[0230] Embodiment 88. A method of positioning a seatpost between a plurality of states, the method comprising: receiving, at a height change assembly of the seatpost, a first input; causing, by the height change assembly, the seatpost to move from an extended state to a retracted state in response to the first input; receiving, at the height change assembly, a second input while the seatpost is in the retracted state; and causing, by the height change assembly, the seatpost to move from the retracted state to the extended state in response to the second input, wherein the first input and the second input are the same.
[0231] Embodiment 89. The method of embodiment 88, further comprising: locking, with a locking assembly, the seatpost in the extended state.
[0232] Embodiment 90. The method of embodiment 89, further comprising locking, with the locking assembly the seatpost in the retracted state.
[0233] Embodiment 91. The method of embodiment 90, further comprising: locking, with a first lock of the locking assembly, the seatpost in the extended state; and locking, with a second lock of the locking assembly, the seatpost in the retracted state.
[0234] Embodiment 92. A method of configuring a seatpost assembly between a plurality of states, the method comprising: switching a seatpost between an extended state and retracted state, wherein switching the seatpost comprises: causing, by a height change assembly, a seatpost to move from an extended state to a retracted state in response to a first input; and causing, by the height change assembly, the seatpost to move from the retracted state to the extended state in response to a second input; wherein the seatpost is movable by the height change assembly between the extended state and the retracted state indefinitely prior to a servicing operation.
[0235] Embodiment 93. The method of embodiment 92, wherein the seatpost is movable by the height change assembly between the extended state and the retracted state at least 100 times prior to the servicing operation.
[0236] Embodiment 94. The method of any one or more of embodiments 92 or 93, wherein the height change assembly comprises a linkage.
[0237] Embodiment 95. A seatpost assembly comprising: a lower post having a non-circular cross-sectional shape; an upper post movable relative to the lower post between a high position and a low position; and a height change assembly operable to drive the upper post from the low position to the high position.
[0238] Embodiment 96. The seatpost assembly of embodiment 95, wherein the lower post comprises a first cross-sectional shape, wherein the upper post comprises a second cross-sectional shape, and wherein the first and second cross-sectional shapes are different from one another.
[0239] Embodiment 97. The seatpost assembly of any one or more of embodiments 95 or 96, wherein the lower post comprises a first cross-sectional shape, wherein the upper post comprises a second cross-sectional shape, and wherein the first and second cross-sectional shapes are generally the same as one another.
[0240] Embodiment 98. The seatpost assembly of any one or more of embodiments 95 to 97, wherein the upper post has a teardrop cross-sectional shape.
[0241] Embodiment 99. The seatpost of any one or more of embodiments 95 to 98, wherein the height change assembly is disposed within a volume defined by the upper and lower posts.
[0242] Embodiment 100. The seatpost of any one or more of embodiments 95 to 99, wherein the height change assembly is operable to drive the upper post from the high position to the low position.

[0243] Embodiment 101. A method of positioning a seatpost assembly between a plurality of states, the method comprising: storing, with an energy storage device, energy from a height change assembly; releasing, with a locking assembly, energy stored with the energy storage device; and storing, with the energy storage device, energy from the height change assembly responsive to the releasing of the energy stored with the energy storage device.
[0244] Embodiment 102. The method of embodiment 101, further comprising: locking, with the locking assembly, a seatpost in an extended position responsive to releasing, with the locking assembly, energy stored with the energy storage device.
[0245] Embodiment 103. The method of any one or more of embodiments 101 or 102, further comprising: detecting, with a sensor, energy stored with the energy storage device; and determining, with a processor, if energy stored with the energy storage device has achieved a threshold.
[0246] Embodiment 104. The method of embodiment 103, further comprising: refusing releasing, with the locking assembly, energy stored with the energy storage device unless the energy storage device has determined, with the processor, that energy stored with the energy storage device has achieved the threshold.
[0247] Embodiment 105. The method of embodiment 103, further comprising:
[0248] generating, with the processor, a ready signal if the processor determines that energy stored with the energy storage device has achieved the threshold.
[0249] While this specification contains many specifics, these should not be construed as limitations on the scope of the invention or of what may be claimed, but rather as descriptions of features specific to particular embodiments of the invention. Certain features that are described in this specification in the context of separate embodiments can also be implemented in combination in a single embodiment. Conversely, various features that are described in the context of a single embodiment can also be implemented in multiple embodiments separately or in any suitable sub-combination. Moreover, although features may be described above as acting in certain combinations and even initially claimed as such, one or more features from a claimed combination can in some cases be excised from the combination, and the claimed combination may be directed to a sub-combination or variation of a sub-combination.
[0250] Similarly, while operations and/or acts are depicted in the drawings and described herein in a particular order, this should not be understood as requiring that such operations be performed in the particular order shown or in sequential order, or that all illustrated operations be performed, to achieve desirable results. In certain circumstances, multitasking and parallel processing may be advantageous. Moreover, the separation of various system components in the embodiments described above should not be understood as requiring such separation in all embodiments, and it should be understood that any described program components and systems can generally be integrated together in a single software product or packaged into multiple software products.
[0251] One or more embodiments of the disclosure may be referred to herein, individually and/or collectively, by the term “invention” merely for convenience and without intending to voluntarily limit the scope of this application to any particular invention or inventive concept. Moreover, although specific embodiments have been illustrated and described herein, it should be appreciated that any subsequent arrangement designed to achieve the same or similar purpose may be substituted for the specific embodiments shown. This disclosure is intended to cover any and all subsequent adaptations or variations of various embodiments. Combinations of the above embodiments, and other embodiments not specifically described herein, are apparent to those of skill in the art upon reviewing the description.
[0252] The Abstract of the Disclosure is provided to comply with 37 C.F.R. § 1.72 (b) and is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Detailed Description, various features may be grouped together or described in a single embodiment for the purpose of streamlining the disclosure. This

disclosure is not to be interpreted as reflecting an intention that the claimed embodiments require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter may be directed to less than all of the features of any of the disclosed embodiments. Thus, the following claims are incorporated into the Detailed Description, with each claim standing on its own as defining separately claimed subject matter.
[0253] It is intended that the foregoing detailed description be regarded as illustrative rather than limiting and that it is understood that the following claims including all equivalents are intended to define the scope of the invention. The claims should not be read as limited to the described order or elements unless stated to that effect. Therefore, all embodiments that come within the scope and spirit of the following claims and equivalents thereto are claimed as the invention.

Claims

1. A seatpost assembly comprising: a lower post; an upper post movable relative to the lower post between a high position and a low position; an actuation assembly configured to receive a user input; and a height change assembly operable to drive the upper post to the high position responsive to receiving the user input and to drive the upper post to the low position responsive to receiving the user input, both without application of rider weight.
2. The seatpost assembly of claim 1, wherein the user input is the same to drive the upper post to the high position and to drive the upper post to the lower position.
3. The seatpost assembly of claim 1, wherein the height change assembly is essentially free of an air pressure vessel.
4. The seatpost assembly of claim 1, wherein the upper post is movable by the height change assembly from the high position to the low position indefinitely prior to a servicing operation.
5. The seatpost assembly of claim 1, wherein the height change assembly comprises: a motor having an output shaft to drive the upper post, wherein the output shaft is disposed in the lower post; and a power source electrically coupled to the motor.
6. The seatpost assembly of claim 1, further comprising a spring, the spring operable to: store energy generated by the height change assembly; release stored energy to drive the upper post to the high position responsive to receiving the user input; and release stored energy to drive the upper post to the low position responsive to receiving the user input.
7. The seatpost assembly of claim 6, wherein the spring is coupled to an energy storage unit, wherein the height change assembly is operable to drive the energy storage unit in: a first direction to store a stored lifting energy; and a second direction, different to the first direction, to store a lowering energy; wherein the stored lifting energy is released to drive the upper post to the high position responsive to receiving the user input; and wherein the stored lowering energy is released to drive the upper post to the low position responsive to receiving the user input.
8. The seatpost assembly of claim 7, further comprising a locking assembly, wherein release of the stored lifting energy and the stored lowering energy is controlled by the locking assembly.
9. A seatpost assembly comprising: a lower post; an upper post movable relative to the lower post between a high position and a low position, wherein the upper post is configured to receive a saddle; and a height change assembly comprising a motor that drives the upper post relative to the lower post between the high position and the low position.
10. The seatpost assembly of claim 9, wherein the motor is coupled to the upper post through an energy storage device.
11. The seatpost assembly of claim 10, wherein the energy storage device is configured to: store energy generated by the motor; and release the stored energy to drive the upper post from a current position of the high and low positions to the other of the high and low positions.
12. The seatpost assembly of claim 11, wherein the stored energy is mechanically stored by a spring.

13. The seatpost assembly of claim 9, further comprising: an actuation assembly configured to receive a user input; and a locking assembly configured to lock the upper and lower posts in at least the upper position; wherein, responsive to receiving the user input, the actuation assembly controls: the locking assembly to unlock the upper and lower posts from one another; the locking assembly to re-lock the upper and lower posts together; and the motor to impart energy to recharge the energy storage device.

14. The seatpost assembly of claim 9, wherein the motor is electrically coupled to a power source, and wherein the power source is coupled to the upper post.

15. The seatpost assembly of claim 9, wherein at least a portion of the motor is disposed inside the lower post, and wherein the motor comprises a threaded rod output shaft that extends into the upper post when the upper post is in at least the low position.

16. A seatpost assembly comprising: a seatpost positionable between an extended state and a retracted state; and an actuation assembly comprising an actuator, the actuator operably coupled to the seatpost, the actuator movable between a first position and a second position; wherein the seatpost moves from the extended state to the retracted state responsive to the actuator moving from the first position to the second position, and wherein the seatpost moves from the retracted state to the extended state responsive to the actuator moving from the first position to the second position.

17. The seatpost assembly of claim 16, wherein operation of the actuator provides the motive force to move the seatpost: from the extended state to the retracted state responsive to the actuator moving from the first position to the second position, and from the retracted state to the extended state responsive to the actuator moving from the first position to the second position.

18. The seatpost assembly of claim 16, further comprising a height change assembly, wherein the height change assembly is configured to transmit motive force to move the seatpost: from the extended state to the retracted state responsive to the actuator moving from the first position to the second position, and from the retracted state to the extended state responsive to the actuator moving from the first position to the second position.

19. The seatpost assembly of claim 18, wherein the height change assembly comprises: an electromechanical drive; and a power source; wherein the electromechanical drive is configured to use power from the power source to apply a mechanical force to the seatpost responsive to operation of the actuator.

20. The seatpost assembly of claim 18, wherein the actuation assembly further comprises a wireless transmitter and wherein the height change assembly further comprises a wireless receiver, the wireless receiver of the height change assembly configured to generate an operation signal responsive to receiving an actuation signal from the wireless transmitter of the actuation assembly.