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(54) **PORTABLE THORACIC BRACE WITH  
SPINAL TRACTION AND METHOD**

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2, 2022.

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**A61F 5/048** (2006.01)

(52) **U.S. Cl.**  
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(2013.01)

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5/048; A61H 1/0218; A61H 1/0292;

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2201/1664; A61H 2201/1207; A61H  
2201/1645; A61H 2201/1253

USPC ..... 602/19  
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

2016/0296361 A1\* 10/2016 Leake ..... A61H 1/0292

\* cited by examiner

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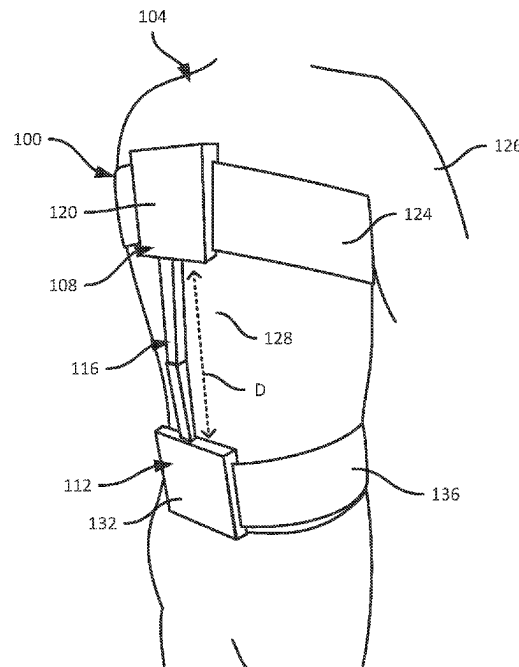
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(57) **ABSTRACT**

A wearable traction device includes: a traction rod including a superior segment, and an inferior segment; a lower anchoring assembly coupled to the inferior segment of the traction rod, the lower anchoring assembly configured for affixing to a lower torso of a user; an upper anchoring assembly movably coupled to the superior segment of the traction rod, the upper anchoring assembly configured for affixing to an upper torso of a user; a releasable lock supported on the upper anchoring assembly, the lock having: (i) an engaged position configured to permit movement of the upper anchoring assembly in a superior direction along the superior segment of the traction rod, and prevent movement of the upper anchoring assembly in an inferior direction along the superior segment, and (ii) a disengaged position configured to permit movement of the upper anchoring assembly in the superior and inferior directions.

**10 Claims, 5 Drawing Sheets**



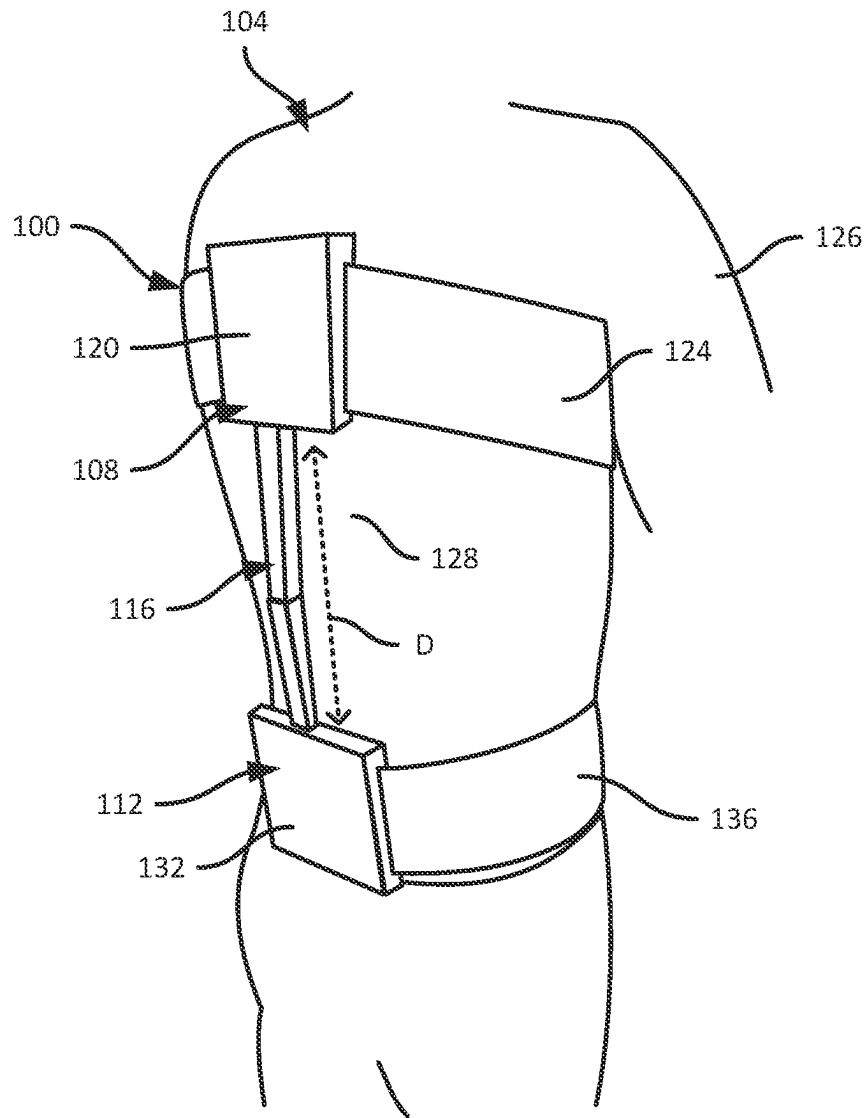


FIG. 1

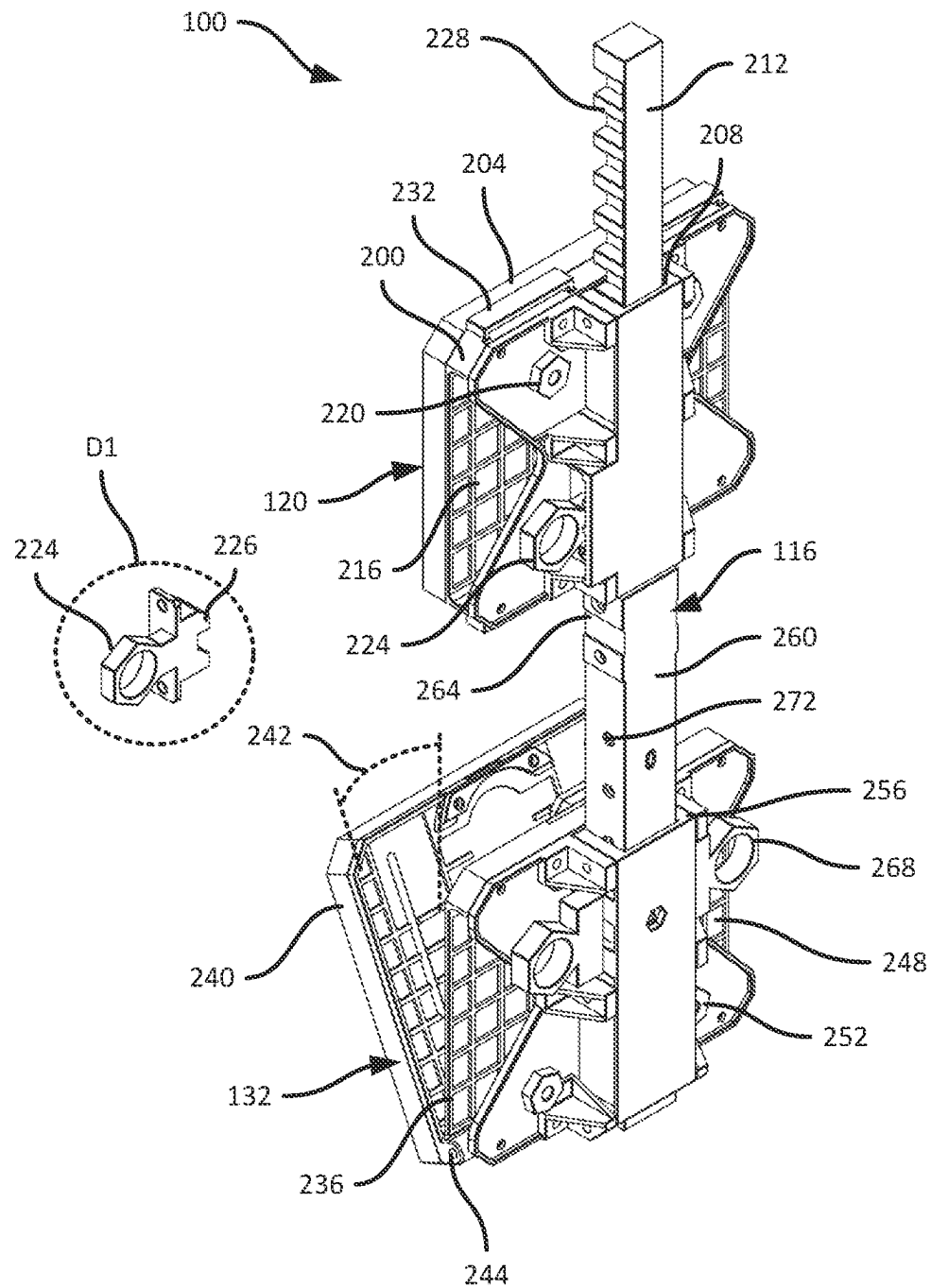


FIG. 2

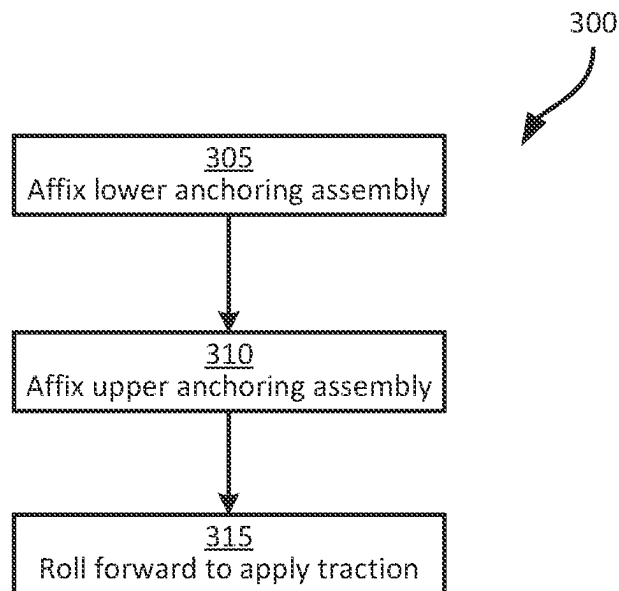


FIG. 3A

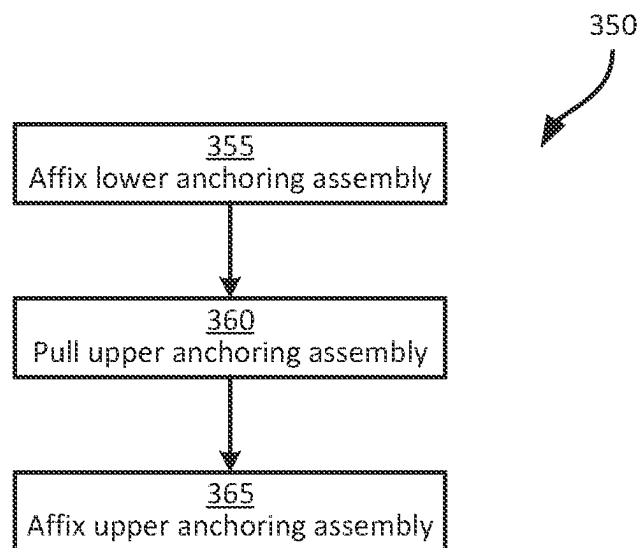


FIG. 3B

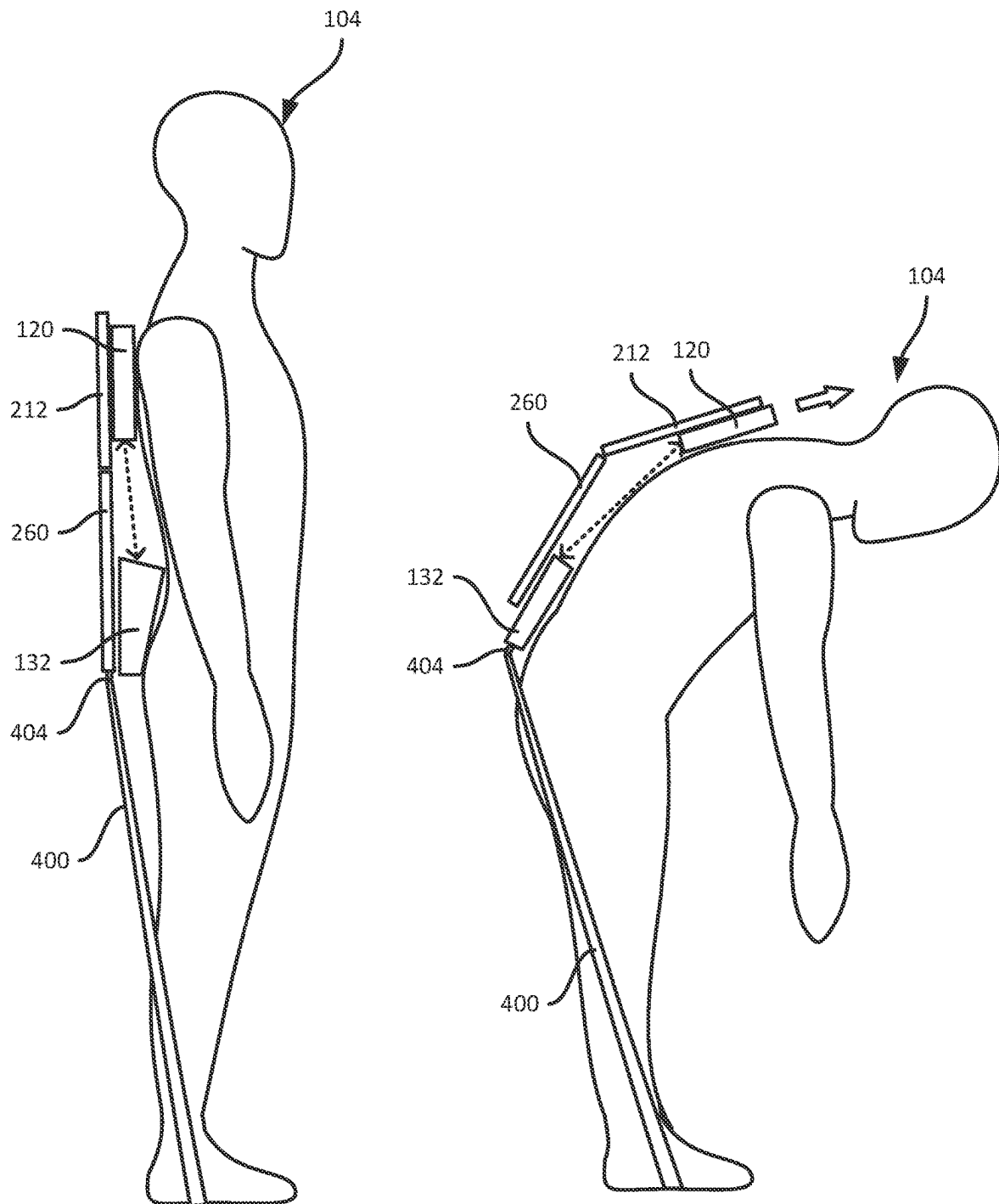


FIG. 4

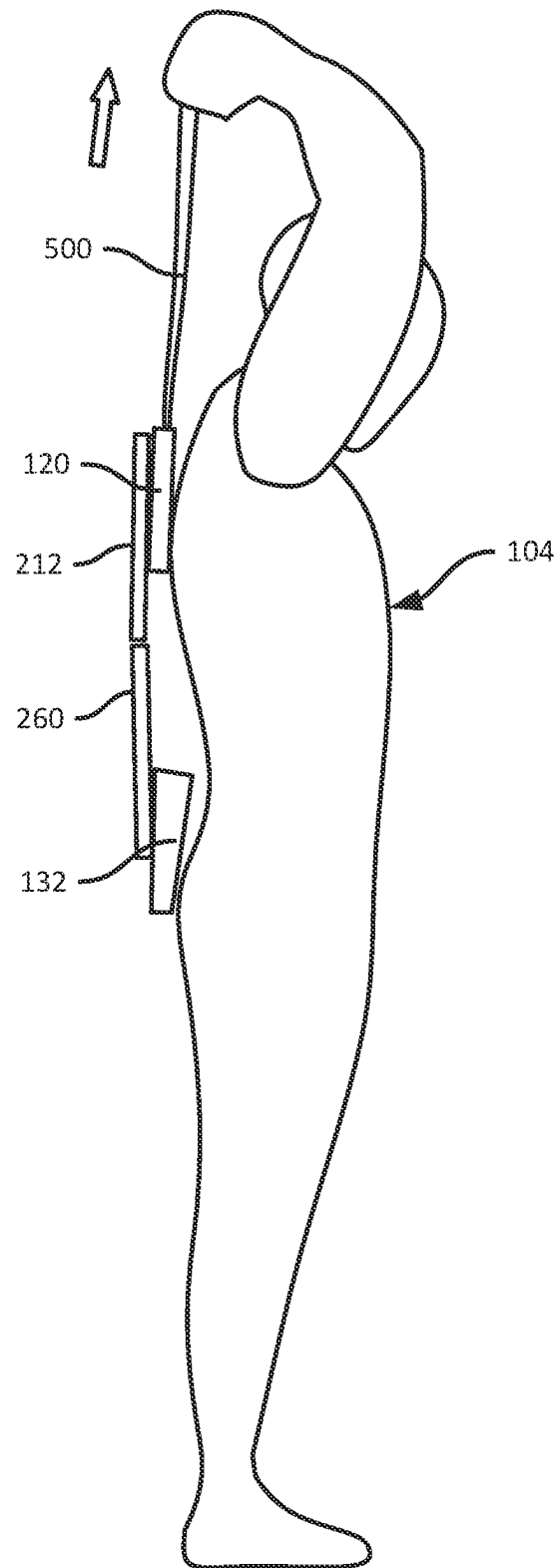


FIG. 5

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**PORTABLE THORACIC BRACE WITH  
SPINAL TRACTION AND METHOD****CROSS-REFERENCE TO RELATED  
APPLICATIONS**

This application claims priority to U.S. Provisional Patent Application No. 63/403,464, filed Sep. 2, 2022, the contents of which are incorporated herein by reference.

**FIELD**

The present invention relates to a thoracic brace, and more particularly to a thoracic brace that applies spinal traction resulting in spinal decompression.

**BACKGROUND**

Back problems are a significant issue for much of the human population; consider that eight out of 10 American will experience back pain in their lifetime. According to Global Burden of Disease Study 2017 (Institute for Health Metrics and Evaluation (IHME), *Findings from the Global Burden of Disease Study 2017*, Seattle, WA: IHME, 2018), back pain is a leading cause of disability worldwide and prevents people from working and doing everyday simple activities. Research by the Mayo Clinic also found that back problems are the third most common reason for a visit to the doctor's office.

Conventional consumer back braces may provide limited support for the spine, e.g., limited to lumbar or lumbar and partial thoracic support. These braces and supports are typically designed from plastics and fabrics and are designed for all day use. Other long-term wear braces exist to treat spinal curvature conditions (scoliosis or kyphosis) and are not suitable for relieving pain from chronic conditions such as sciatica, or herniated or bulging disc. Devices that apply traction to a user's spine may have bed-like form factors, and the use of such devices may therefore involve lying down and being restrained against the device, impeding or preventing other activities. Such devices may also be complex and costly.

**SUMMARY**

An aspect of the specification provides a wearable traction device, comprising: a traction rod including a superior segment, and an inferior segment; a lower anchoring assembly coupled to the inferior segment of the traction rod, the lower anchoring assembly configured for affixing to a lower torso of a user; an upper anchoring assembly movably coupled to the superior segment of the traction rod, the upper anchoring assembly configured for affixing to an upper torso of a user; a releasable lock supported on the upper anchoring assembly, the lock having: (i) an engaged position configured to permit movement of the upper anchoring assembly in a superior direction along the superior segment of the traction rod, and prevent movement of the upper anchoring assembly in an inferior direction along the superior segment, and (ii) a disengaged position configured to permit movement of the upper anchoring assembly in the superior and inferior directions.

**BRIEF DESCRIPTIONS OF THE DRAWINGS**

Embodiments are described with reference to the following figures.

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FIG. 1 is a diagram of a wearable traction device worn by a user.

FIG. 2 is an isometric view of the wearable traction device in isolation.

FIG. 3A is a flow chart of a method of applying and activating the device of FIG. 2.

FIG. 3B is a flow chart of another method of applying and activating the device of FIG. 2.

FIG. 4 is a diagram of an example performance of the method of FIG. 3A.

FIG. 5 is a diagram of an example performance of the method of FIG. 3B.

**DETAILED DESCRIPTION**

FIG. 1 depicts a wearable traction device 100 (also referred to herein as the device 100) in an operational configuration, e.g., worn by a user 104. The device 100 includes an upper anchoring assembly 108, a lower anchoring assembly 112, and a traction rod 116 (which may also be referred to as the decompression rod 116) extending between the anchoring assemblies 108 and 112. The upper anchoring assembly 108, in this example, includes a traction plate 120 and a belt 124. The plate 120 is configured to rest against a back 128 of the user 104, and the belt 124 is configured to encircle the torso of the user 104, e.g., under the arms 126 of the user 104 to wrap around the chest, to substantially affix the plate 120 in the illustrated position (e.g., to mitigate or prevent movement of the plate 120 relative to the back 128).

The lower anchoring assembly 112 includes a traction plate 132 configured to rest against the back 128, and a belt 136 configured to encircle the torso of the user 104, e.g., at or near the waist of the user 104, to substantially affix the plate 132 in the illustrated position. The belts 124 and 136 can include Velcro, buckles, or other adjustment mechanisms to accommodate various torso sizes. The belts 124 and 136 can further include pouches or the like to receive one or more reinforcing plates. For example, the belts 124 and 136 can include nylon or other textile belts, configured to receive reinforcing plates of plastic (e.g., ABS or the like). In other examples, such reinforcing plates can be omitted, e.g., if the belts 124 and/or 136 are sufficiently rigid. For example, a segmented metal belt, a leather belt, or the like, may have sufficient stiffness to avoid the need for reinforcement.

The upper anchoring assembly 108, in other words, is configured to affix to an upper torso of the user 104, e.g., placing the plate 120 adjacent to thoracic vertebrae (e.g., T5 and/or T6, although the exact position of the plate 120 may vary). The lower anchoring assembly 112, meanwhile, is configured to affix to a lower torso of the user 104, e.g., placing the plate 132 adjacent to the lumbar vertebrae and/or sacrum of the user 104. As described below in greater detail, the positions of either or both of the anchoring assemblies 108 and 112 along the traction rod 116 can be adjusted to increase a distance "D" between the plates 120 and 132. Engagement between the anchoring assemblies 108 and 112 and the traction rod 116 serves to maintain a set distance D between the anchoring assemblies 108 and 112, resisting or preventing a reduction in the distance D during use of the device 100.

Affixing of the anchoring assemblies 108 and 112 to the user 104, coupled with maintenance of the distance D via the traction rod 116, therefore enables the device 100 to apply traction to a portion of the spine of the user 104. Application of traction by the device 100 can decompress the spinal column of the user 104, which may relieve pain from various

conditions (e.g., compressed nerve roots, joints, and related tissues), while the device **100** is worn and for a period of time (e.g., hours to days) after the device **100** is removed. Further, as discussed below, the device **100** can be operated by the user **104** with little or no assistance from third parties, and because the device **100** is wearable, the user **104** may remain mobile while wearing the device **100**, rather than being restricted to a fixed location, as is the case with certain other spinal traction devices.

Turning to FIG. 2, an example embodiment of the device **100** is shown in isolation, with the belts **124** and **136** omitted. As shown in FIG. 2, the traction plate **120** of the upper anchoring assembly **108** includes a base **200** supporting a pad **204**. The base **200** can be fabricated from a suitable plastic, metal, composite, or the like, and couples the plate **120** to the traction rod **116**. In particular, the base **200** defines a channel **208** through which a superior segment **212** (e.g., upper, towards the head of the user **104** when the device **100** is in use) of the rod **116** is received.

The base **200** also defines a raceway **216** or other form of channel therethrough, for receiving the belt **124**. The base **200** can support one or more locking screws **220** (two are shown in this example) to secure the belt **124** within the raceway **216** (e.g., by extending into the raceway **216** and pinning the belt **124** against the other side of the raceway **216**). In other examples, the belts **124** and/or **136** can include distinct pieces or sections coupled to either side of the plates **120** and **132** respectively, rather than one piece or section that traverses the corresponding plate **120** or **132** via a raceway such as the raceway **216**.

The pad **204** can be formed from a suitable foam, rubber, or the like, e.g., with a lower stiffness than the material forming the base **200**. The pad **204** is configured to rest directly against the back **128** of the user **104** (not necessarily in contact with skin, e.g., over the user's clothing). In the illustrated example, the surface of the pad **204** configured to contact the user's back **128** is planar, but in other examples the pad **204** can have a curved surface for user comfort.

The device **100** also includes a releasable lock **224**. The lock **224** is supported on the upper anchoring assembly **108** (e.g., by the member defining the channel **208**), and specifically on the base **200** in this example. The lock **224**, as shown in the detail view D1 includes, one or more protrusions **226** that extend into the channel **208** to engage with a ratchet **228** (e.g., a linear gear) defined on the superior segment **212** of the rod **116**. The lock **224** has an engaged position (illustrated in FIG. 2), in which the lock **224** is engaged with the ratchet **228**, and prevents movement of the base **200** in an inferior direction (e.g., towards the lower anchoring assembly **112**). The lock **224** permits, however, movement of the base **200** in a superior direction (e.g., away from the lower anchoring assembly **112**, towards a head of the user **104** in operation) in the engaged position. In a disengaged position, the protrusions of the lock **224** are at least partially withdrawn from the channel, such that they no longer engage with the ratchet **228**. The base **200** can then move in either direction along the rod **116**. The lock **224** is biased towards the engaged position, e.g., with a spring or the like.

The base **200** can also, in some examples, include a slot **232** (in this example, the base **200** includes two slots **232**) configured to receive a strap or sling (not shown). The strap or sling can assist application of the device **100** to the user **104**, e.g., by suspending the device **100** from one or both shoulders, or from the neck, of the user **104** before the belts **124** and **136** are fastened.

Turning to the lower anchoring assembly **112**, as shown in FIG. 2 the plate **132** includes a base **236**, and a pad **240**. The pad **240** can be mounted to the base **236** at an adjustable angle **242**, e.g., by rotating about a pivot **244** defined by the base **236**. The plate **132** can include a bias element such as a coil spring between the base **236** and the pad **240**, e.g., to bias the pad **240** outwards from the base **236**. As with the plate **120**, the base **236** defines a raceway **248** to receive the belt **136**, and one or more locking screws **252** (two are shown in this example) to secure the belt **136** within the raceway **248**. The base **236** also includes a channel **256** to receive an inferior segment **260** (e.g., lower, towards the feet of the user **104** when the device **100** is in use) of the traction rod **116**.

The segments **212** and **260** of the rod **116** can, in some examples, be formed as a single integrated rod. In this example, the segments **212** and **260** are separate to allow telescopic adjustment of the length of the rod **116**, e.g., to accommodate various user heights. The segments **212** and **260** can also be coupled at a joint **264** that allows some angular deflection between the segments **212** and **260** (e.g., up to about ten degrees), to better conform to the shape of the user's back **128**. The rod **116** can be fabricated from any material sufficiently stiff to substantially resist deformation when the device **100** is applying traction to the user **104** (e.g., to compress no more than about one percent of the total length of the rod **116**, and/or to flex no more than about five degrees).

In some examples, the position of the lower anchoring assembly **112** along the rod **116** can be adjusted, via adjustment of the plate **132** along the rod **116**. For example, the device **100** can include one or more (two are shown in this example) locks **268** supported by the plate **132** and configured to engage apertures **272** in the inferior segment **260** of the rod **116**. The locks **268** prevent movement of the plate **132** along the segment **260** of rod **116** when engaged, and permit movement of the plate **132** along the segment **260** when disengaged. The locks **268** can therefore be employed to adjust the position of the lower anchoring assembly **112** to accommodate various user heights, in addition to or instead of the telescopic adjustment mentioned above. In other examples, the lower segment **260** can include a ratchet similar to the ratchet **228** for adjusting the position of the plate **132**. In such examples, the locks **268** can serve to permit only movement in an inferior direction when engaged, and to permit movement of the plate **132** in either direction when disengaged.

Turning to FIG. 3A and FIG. 3B, various methods of operating the device **100**, e.g., by the user **104**, are discussed. FIG. 3A illustrates a first method **300** of applying and activating the device **100** (e.g., to apply spinal traction to the user **104**). At block **305**, the lower anchoring assembly **112** is affixed to the user **104**, e.g., by fastening the belt **136** around the user's waist as shown in FIG. 1. At block **310**, the upper anchoring assembly **108** is affixed to the user **104**, e.g., by fastening the belt **124** around the user's chest as shown in FIG. 1. Blocks **305** and **310** can be performed in the opposite order than that shown in FIG. 3A, in other examples. The slot(s) **232** can be employed to hang the device **100** from one or both shoulders of the user **104** via straps or slings, until at least one of the belts **124** and **136** is fastened.

Once the belts **124** and **136** are fastened, at block **315** the user **104** can roll forward (e.g., apply spinal flexion) to increase the distance between the plates **120** and **132**. The lock **224**, in the engaged position, permits superior movement of the plate **120**, and resists inferior movement of the



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plate 120 along the rod 116. Thus, when the user 104 returns to an upright position, the plate 120 remains at the increased distance, thus applying traction to a portion of the user's spine (e.g., resisting spinal compression resulting from the weight of the user's torso by transferring the weight to the belt 136 and the user's hips).

While applying spinal flexion at block 315, the user 104 can hold the lower anchoring assembly 112 in place by hand, e.g., to prevent the lower anchoring assembly 112 from sliding upwards along the torso of the user 104. In other examples, a strap can be mounted to a slot on the inferior side of the plate 132 (similar to the slots 232), with a length sufficient to reach the user's feet. By stepping on the strap, the lower anchoring assembly can be maintained in position while traction is applied at block 315.

FIG. 4 illustrates an example activation of the device 100 via the method 300. In particular, as shown in the left portion of FIG. 4, in an initial position, the device 100 is affixed to the user 104. When first affixed to the user 104, the device 100 applies little or no traction. As shown in the right portion of FIG. 4, when the user rolls forward (range of motion exaggerated for illustrative purposes), the distance between the plates 120 and 132 is increased, and the ratchet subsequently maintains the increased distance when the user 104 returns to an upright position. As shown in FIG. 4, a strap 400 extending from a slot 404 or other fixture on the plate 132 can extend under the feet of the user 104 to prevent the plate 132 from sliding up the user's back.

Returning to FIG. 3B, a further method 350 of applying and activating the device 100 is illustrated. At block 355, the lower anchoring assembly 112 is affixed to the user 104, as noted above in connection with block 305. The upper anchoring assembly 108 can be fastened loosely, but is not affixed at this point. At block 360, the upper anchoring assembly 108 is pulled, e.g., overhead by the user 104, to move the upper anchoring assembly 108 in a superior direction along the rod 116. Once the position of the upper anchoring assembly 108 has been set, the upper anchoring assembly 108 can be affixed at block 365, e.g., by tightening the belt 124. FIG. 5 illustrates an example performance of block 360, in which the user pulls overhead on the upper anchoring assembly, e.g., via a strap or sling 500 mounted to the plate 120 via one or more slots 232.

The scope of the claims should not be limited by the embodiments set forth in the above examples, but should be given the broadest interpretation consistent with the description as a whole.

The invention claimed is:

1. A wearable traction device, comprising:

- a traction rod including a superior segment, and an inferior segment;
- a lower anchoring assembly coupled to the inferior segment of the traction rod, the lower anchoring assembly configured for affixing to a lower torso of a user;
- an upper anchoring assembly movably coupled to the superior segment of the traction rod, the upper anchoring assembly configured for affixing to an upper torso of the user;
- a releasable lock supported on the upper anchoring assembly, the releasable lock having:
  - (i) an engaged position configured to permit movement of the upper anchoring assembly in a superior direction along the superior segment of the traction rod,

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and prevent movement of the upper anchoring assembly in an inferior direction along the superior segment, and

- (ii) a disengaged position configured to permit movement of the upper anchoring assembly in the superior and inferior directions.

2. The wearable traction device of claim 1, wherein the lower anchoring assembly and the upper anchoring assembly each include:

- a traction plate coupled to the traction rod, and configured to rest against a back of the user; and
- a belt coupled to the traction plate, and configured to extend around a torso of the user.

3. The wearable traction device of claim 2, wherein the traction plate of the lower anchoring assembly further includes:

- a base coupled to the traction rod; and
- a pad mounted to the base at an adjustable angle relative to the base.

4. The wearable traction device of claim 3, wherein the traction plate of the lower anchoring assembly further includes a bias member biasing the pad away from the base.

5. The wearable traction device of claim 2, wherein the belt of each anchoring assembly includes a pocket configured to receive a reinforcing member.

6. A method of activating the wearable traction device of claim 1, the method comprising:

- affixing the lower anchoring assembly to the lower torso of the user;
- affixing the upper anchoring assembly to the upper torso of the user;
- subsequent to affixing the lower anchoring assembly and the upper anchoring assembly, applying traction to the upper anchoring assembly to move the upper anchoring assembly in the superior direction along the traction rod.

7. The method of claim 6, wherein applying traction includes performing a spinal flexion movement by the user.

8. The method of claim 6, wherein the method further comprises:

- after affixing the lower and upper anchoring assemblies, and prior to applying traction to the upper anchoring assembly, restricting movement of the lower anchoring assembly relative to the torso of the user.

9. The wearable traction device of claim 1, wherein the superior segment of the traction rod includes a ratchet, and wherein the releasable lock includes a protrusion configured to engage with the ratchet in the engaged position.

10. A method of activating the wearable traction device of claim 1, the method comprising:

- affixing the lower anchoring assembly to the lower torso of the user;
- subsequent to affixing the lower anchoring assembly, applying traction to the upper anchoring assembly to move the upper anchoring assembly in the superior direction along the traction rod; and
- subsequent to applying traction to the upper anchoring assembly, affixing the upper anchoring assembly to the upper torso of the user.

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