US011857824B2

(12) **United States Patent**
Hartigan, Sr.

(10) **Patent No.: US 11,857,824 B2**
(45) **Date of Patent: Jan. 2, 2024**

(54) **STRENGTH-TRAINING APPARATUS FOR OUTDOOR USE WITH A HITCH OR GROUND RECEIVER**

(71) Applicant: **Paul E Hartigan, Sr.**, Alexandria, VA (US)

(72) Inventor: **Paul E Hartigan, Sr.**, Alexandria, VA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 190 days.

(21) Appl. No.: **17/571,441**

(22) Filed: **Jan. 7, 2022**

(65) **Prior Publication Data**

US 2023/0218942 A1 Jul. 13, 2023

(51) **Int. Cl.**

A63B 21/055	(2006.01)
A63B 21/06	(2006.01)
B60D 1/01	(2006.01)
B60D 1/58	(2006.01)

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

CPC ***A63B 21/0552*** (2013.01); ***A63B 21/06*** (2013.01); ***B60D 1/01*** (2013.01); ***B60D 1/58*** (2013.01)

(58) **Field of Classification Search**

CPC A63B 21/02–0557

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,558,608	A *	9/1996	Hall	A63B 21/4035	482/904
5,626,546	A *	5/1997	Little	A63B 21/4001	482/904
5,997,448	A *	12/1999	Duba	A63B 21/1681	482/121
6,142,919	A *	11/2000	Jorgensen	A63B 21/154	482/904
6,652,425	B1 *	11/2003	Martin	A63B 21/154	482/57
7,736,286	B2 *	6/2010	Panaiotov	A63B 21/0552	482/121
8,690,742	B1 *	4/2014	Herman	A63B 21/0552	482/904
9,295,870	B2 *	3/2016	Mikulski	A63B 21/16	
9,320,934	B1 *	4/2016	Pringle	A63B 21/068	
9,333,822	B1 *	5/2016	LaFave	B60R 9/06	
10,046,712	B1 *	8/2018	Foley	B60R 9/06	
10,307,634	B2 *	6/2019	Young	A63B 71/023	
10,512,813	B1 *	12/2019	Hayward	A63B 21/0557	
10,646,738	B2 *	5/2020	Arturo	A63B 23/03541	
11,529,537	B1 *	12/2022	Bravo	A63B 69/20	
2006/0186638	A1 *	8/2006	Varner	A63B 71/023	280/506
2006/0258519	A1 *	11/2006	Ardito, III	A63B 21/0552	482/121
2007/0099780	A1 *	5/2007	Bowser	A63B 21/00043	482/148
2008/0128463	A1 *	6/2008	Bryan	A63B 21/00047	224/486
2009/0187128	A1 *	7/2009	Nagabhushan	A63B 21/1609	602/18

(Continued)

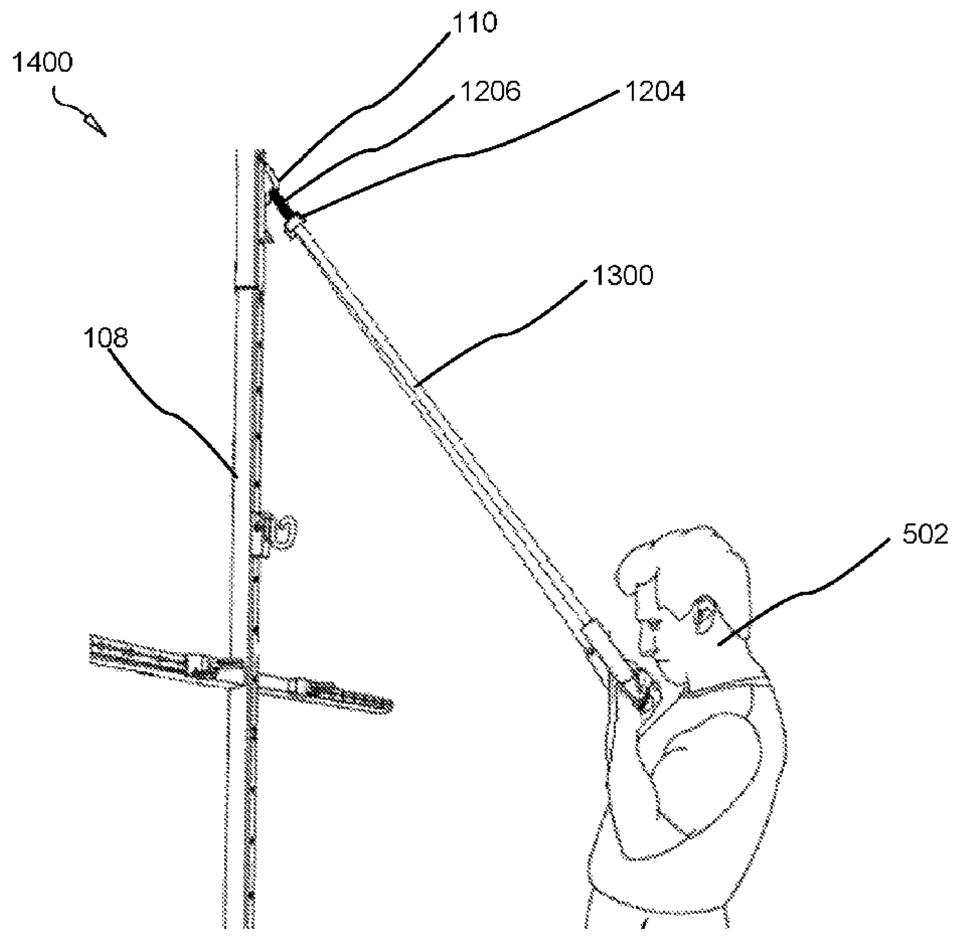
Primary Examiner — Nyca T Nguyen

(74) *Attorney, Agent, or Firm* — Steven Rinehart

(57) **ABSTRACT**

A strength-training device having, in some embodiments, an L-shaped bracket adapted to insert into a hitch assembly on a vehicle, the strength-training device comprising a cruciform and one or more shuttles and anchor points for elongated straps.

9 Claims, 15 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

2010/0048368	A1*	2/2010	Donofrio	A63B 21/0552 482/130
2011/0251025	A1*	10/2011	Harker	A63B 21/0442 482/91
2014/0018215	A1*	1/2014	Donofrio	A63B 21/169 482/129
2014/0296037	A1*	10/2014	Razzaq	A63B 21/4033 482/99
2016/0144258	A1*	5/2016	Stephens	A63B 69/36212 473/409
2017/0056701	A1*	3/2017	Hammett	A63B 21/0428
2017/0056718	A1*	3/2017	Davis	A63B 21/169
2017/0100624	A1*	4/2017	Young	A63B 17/04
2022/0016470	A1*	1/2022	Seamans	A63B 21/16

* cited by examiner

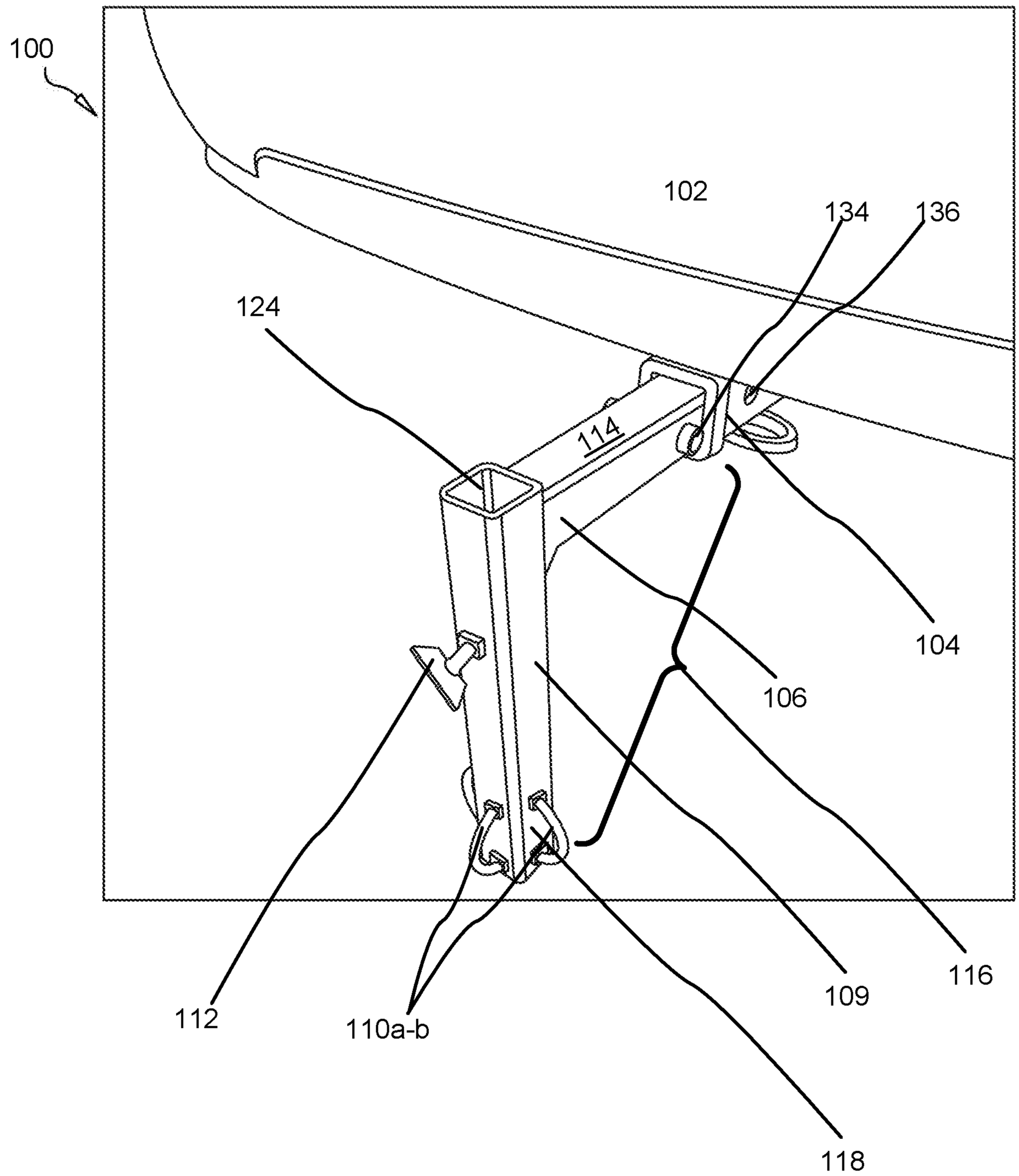


FIG. 1

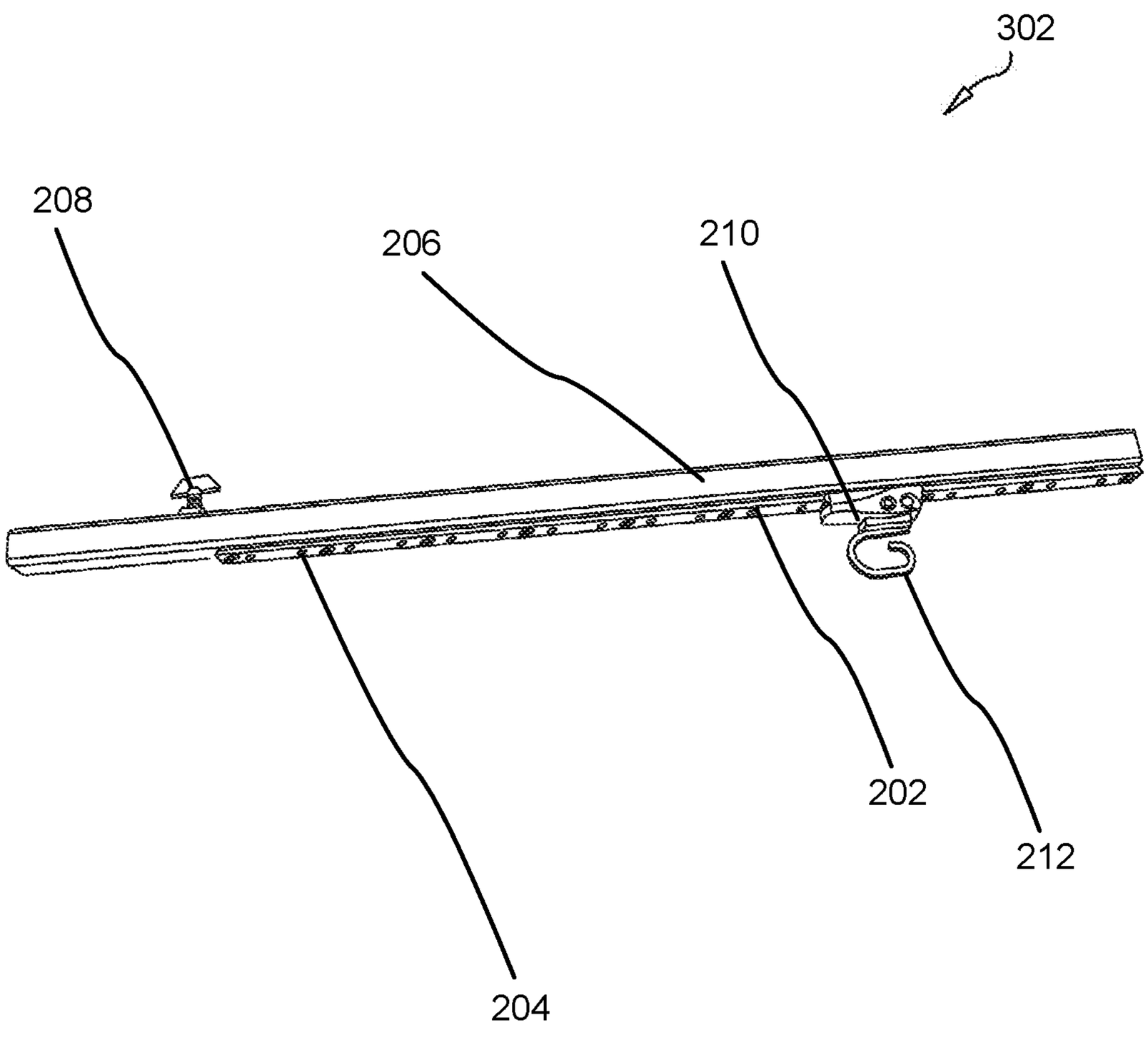


FIG. 2

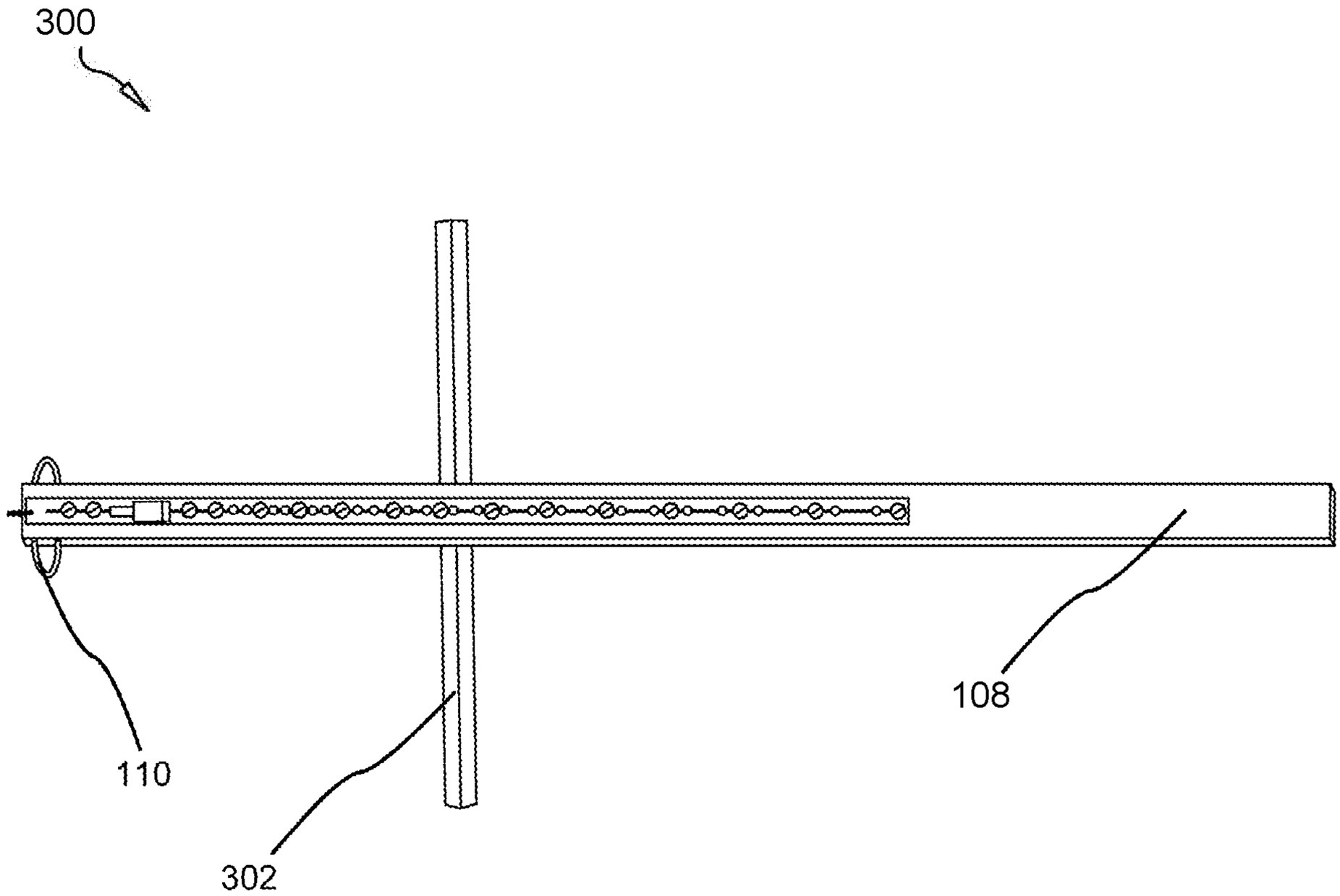


FIG. 3

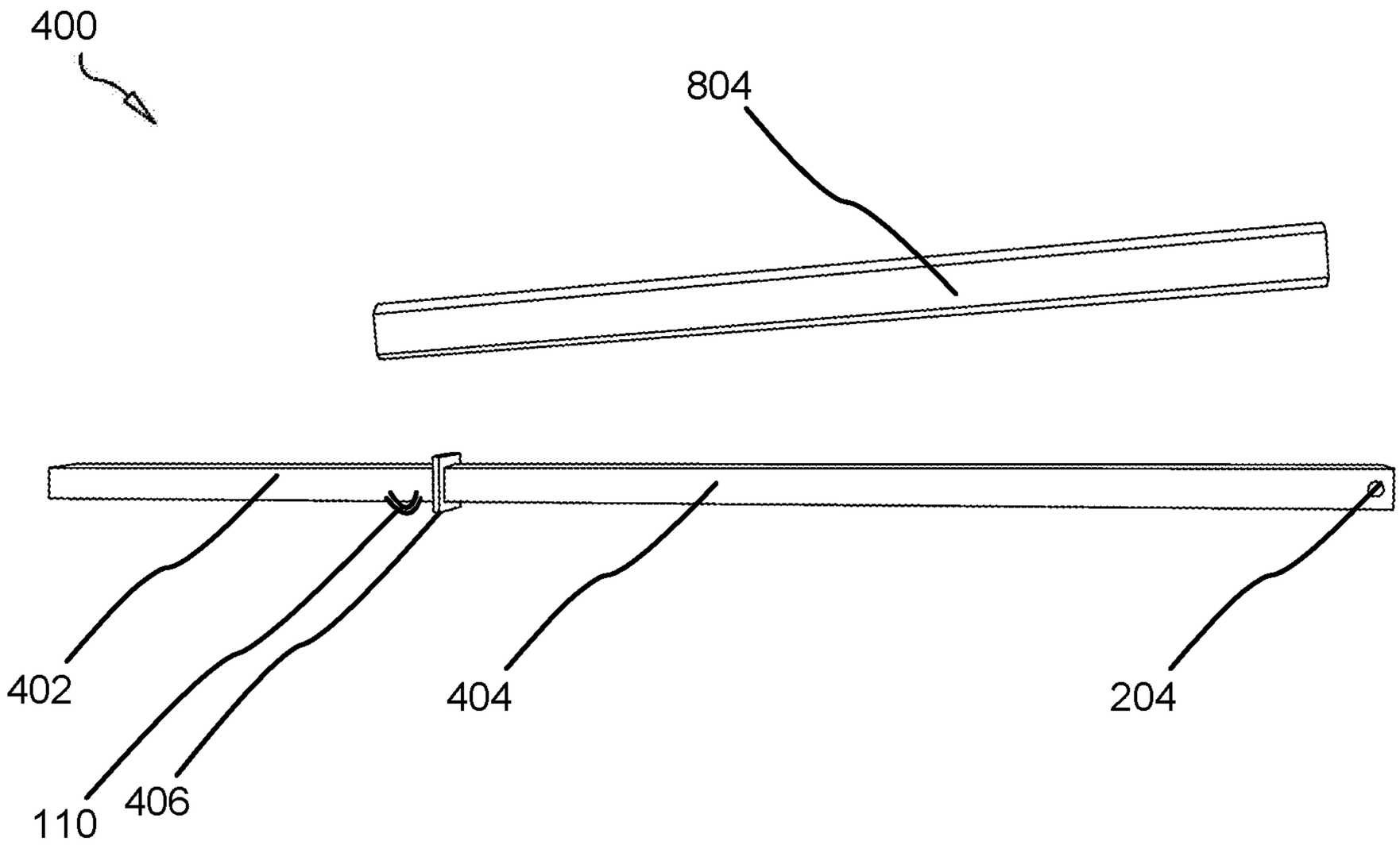


FIG. 4

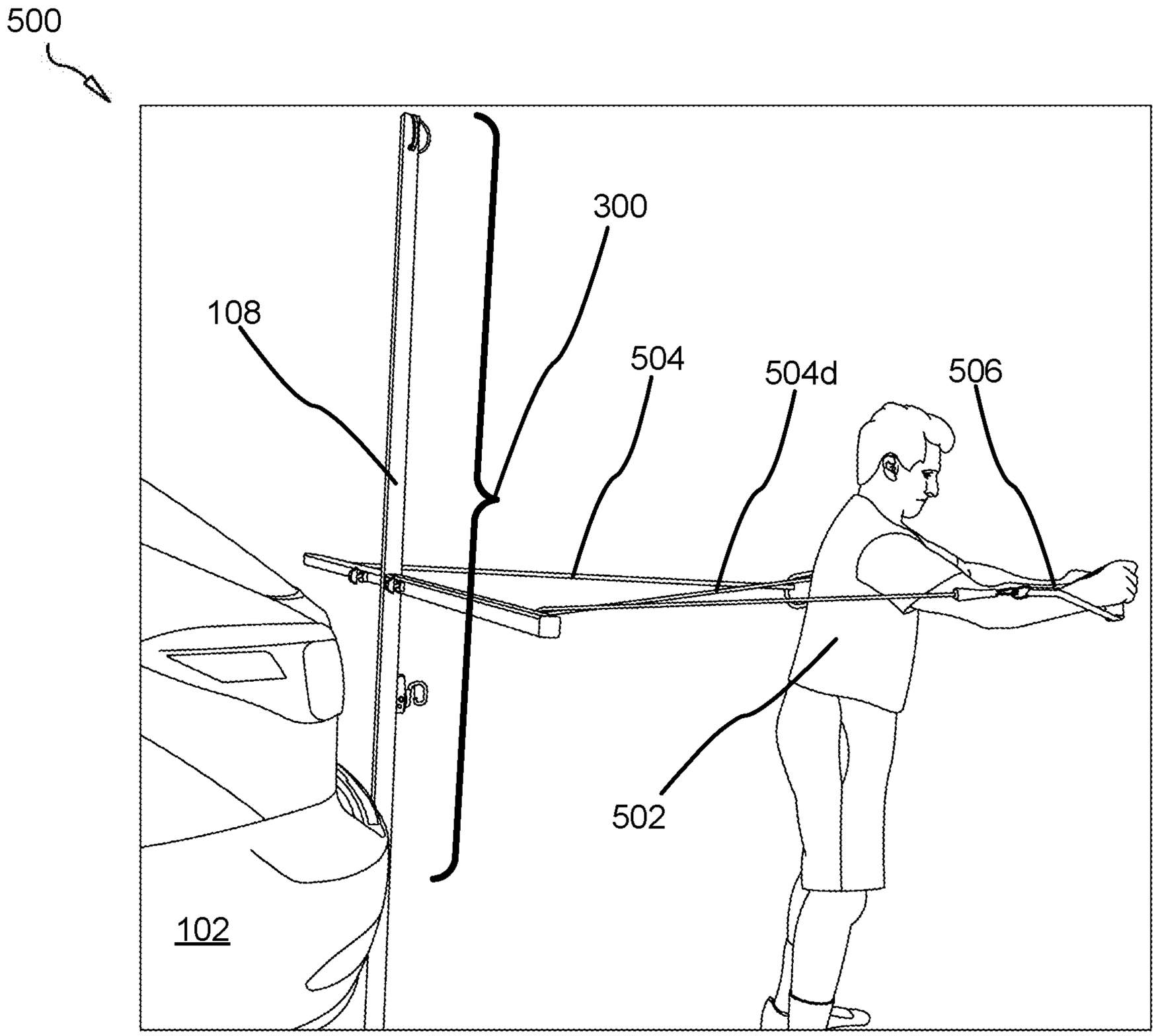


FIG. 5

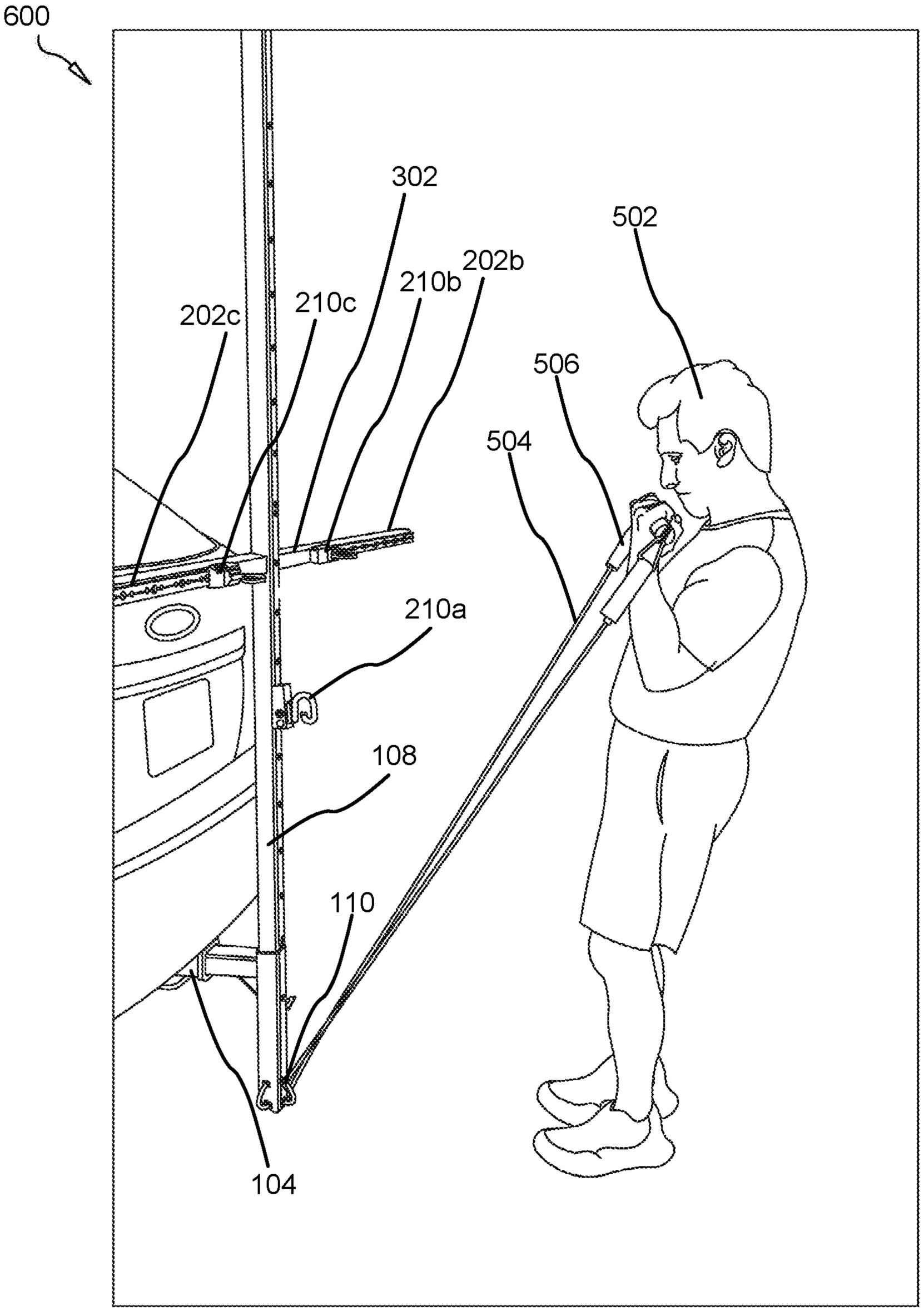


FIG. 6

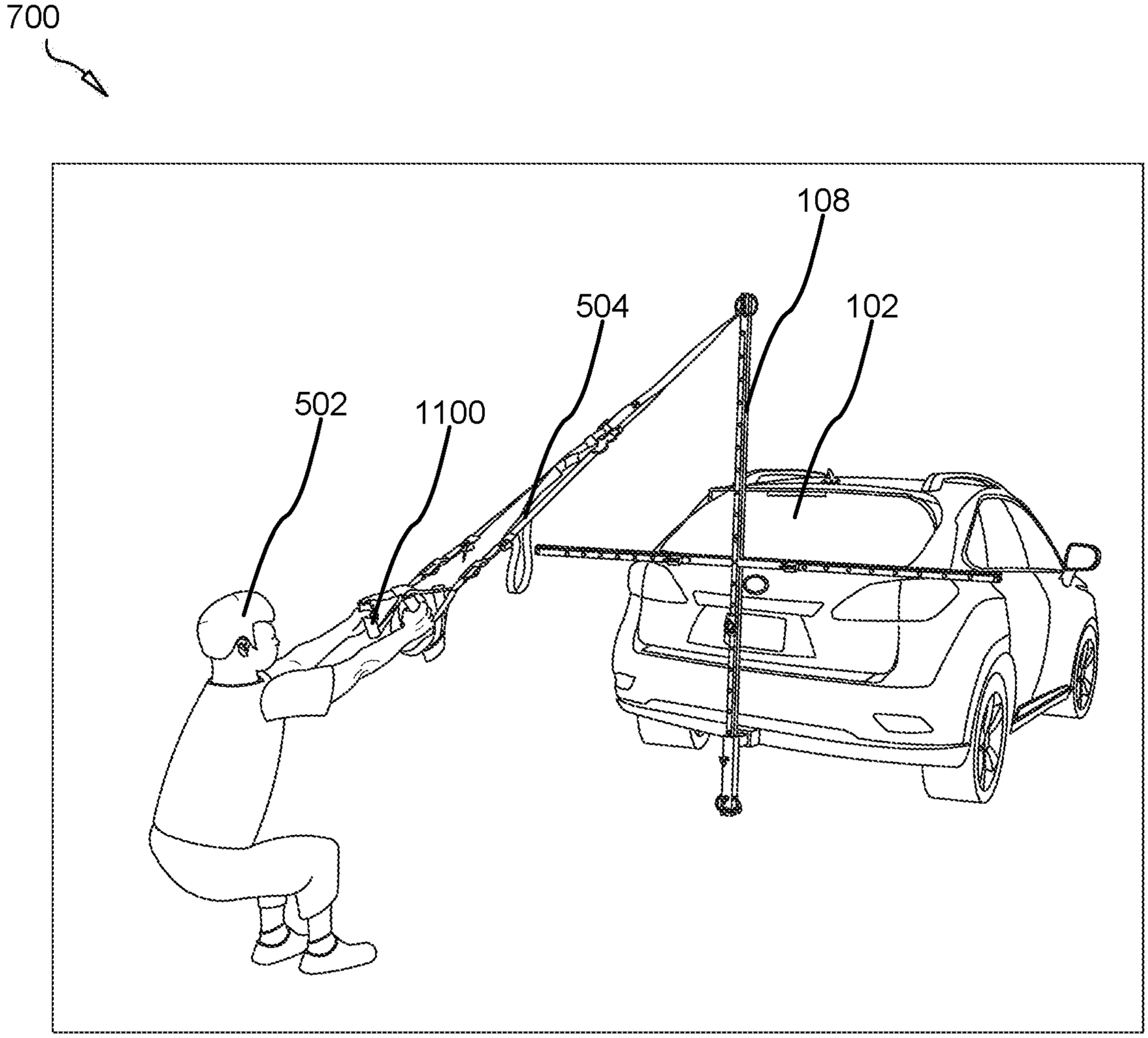


FIG. 7

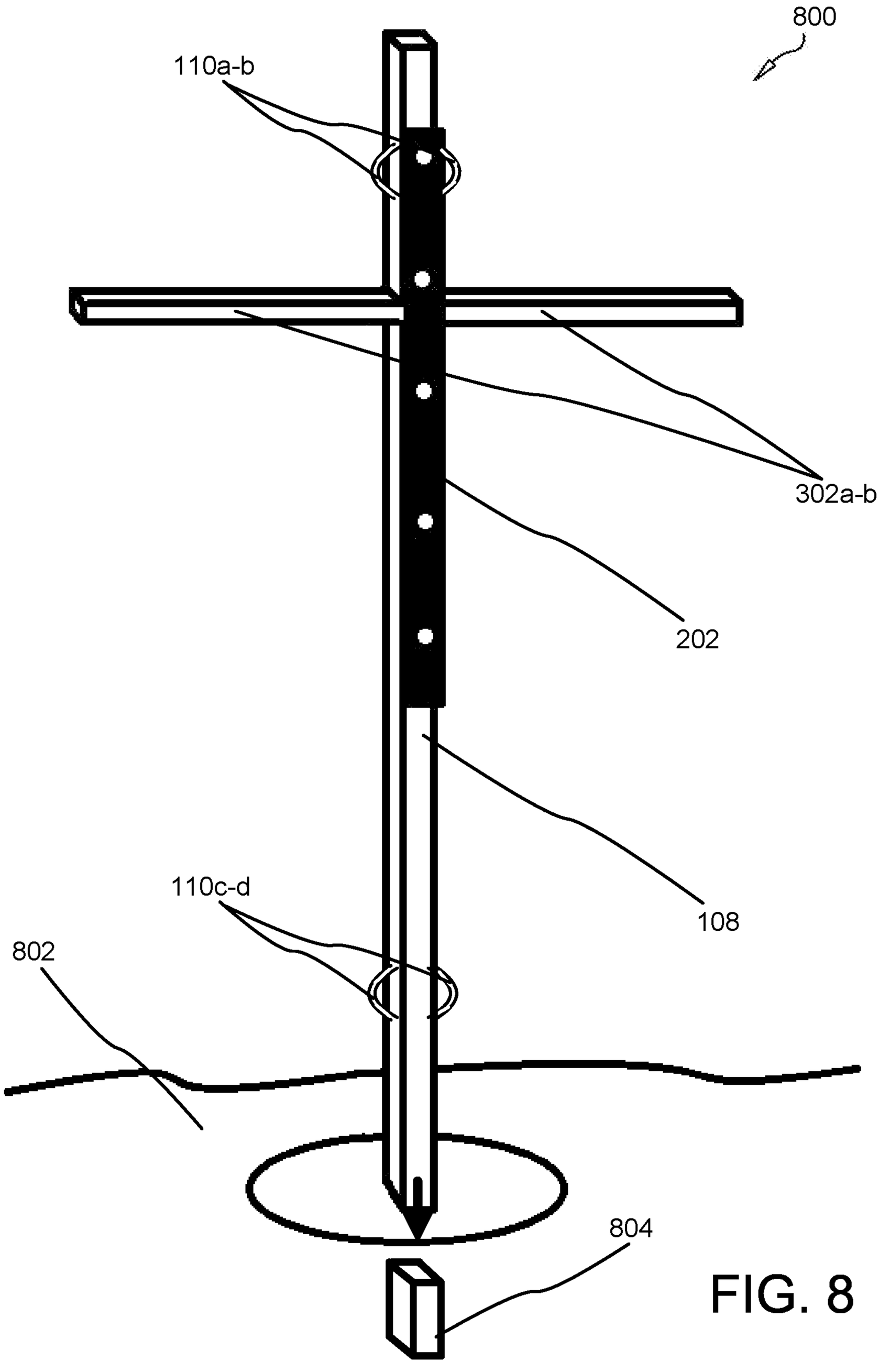


FIG. 8

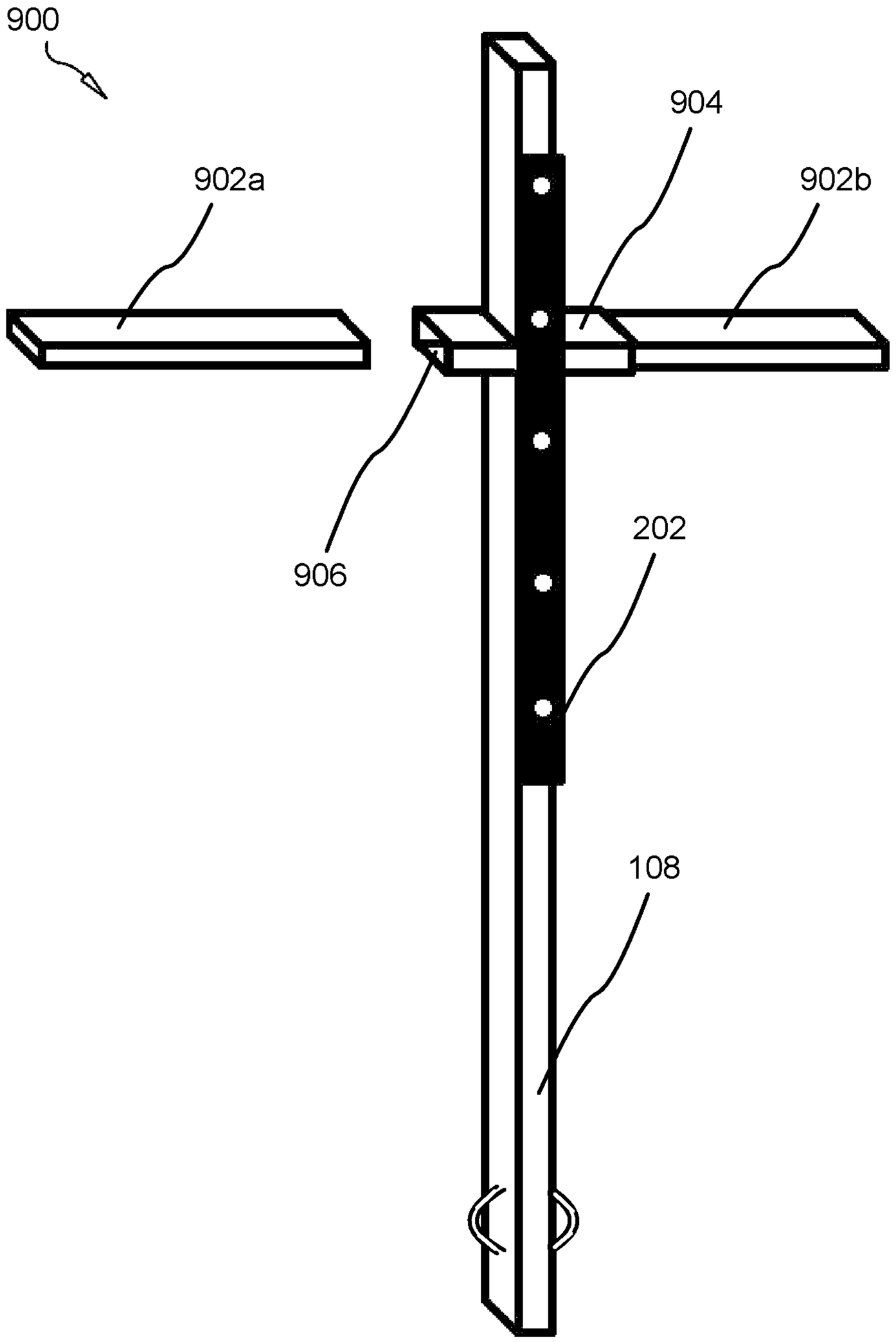


FIG. 9

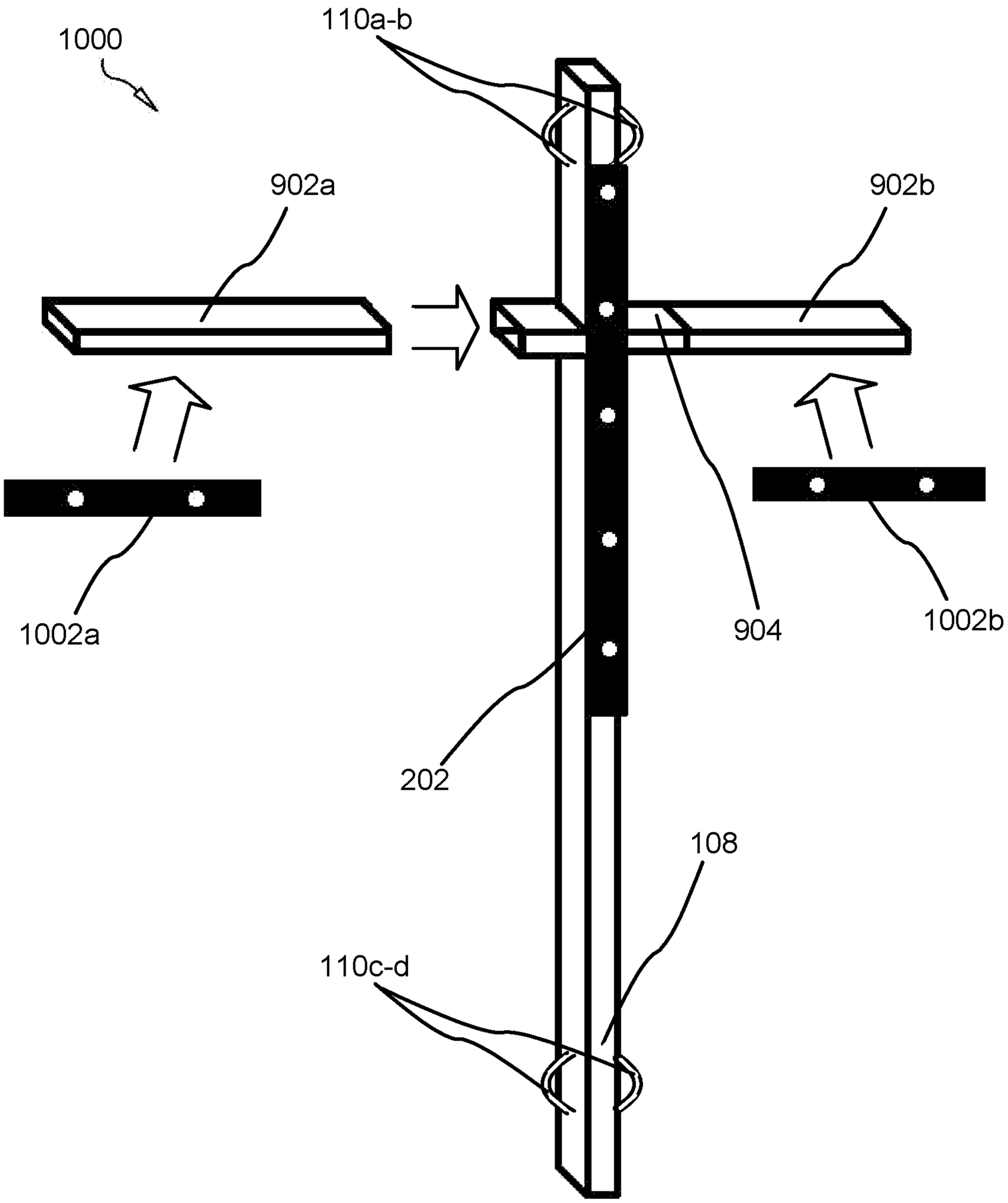


FIG. 10

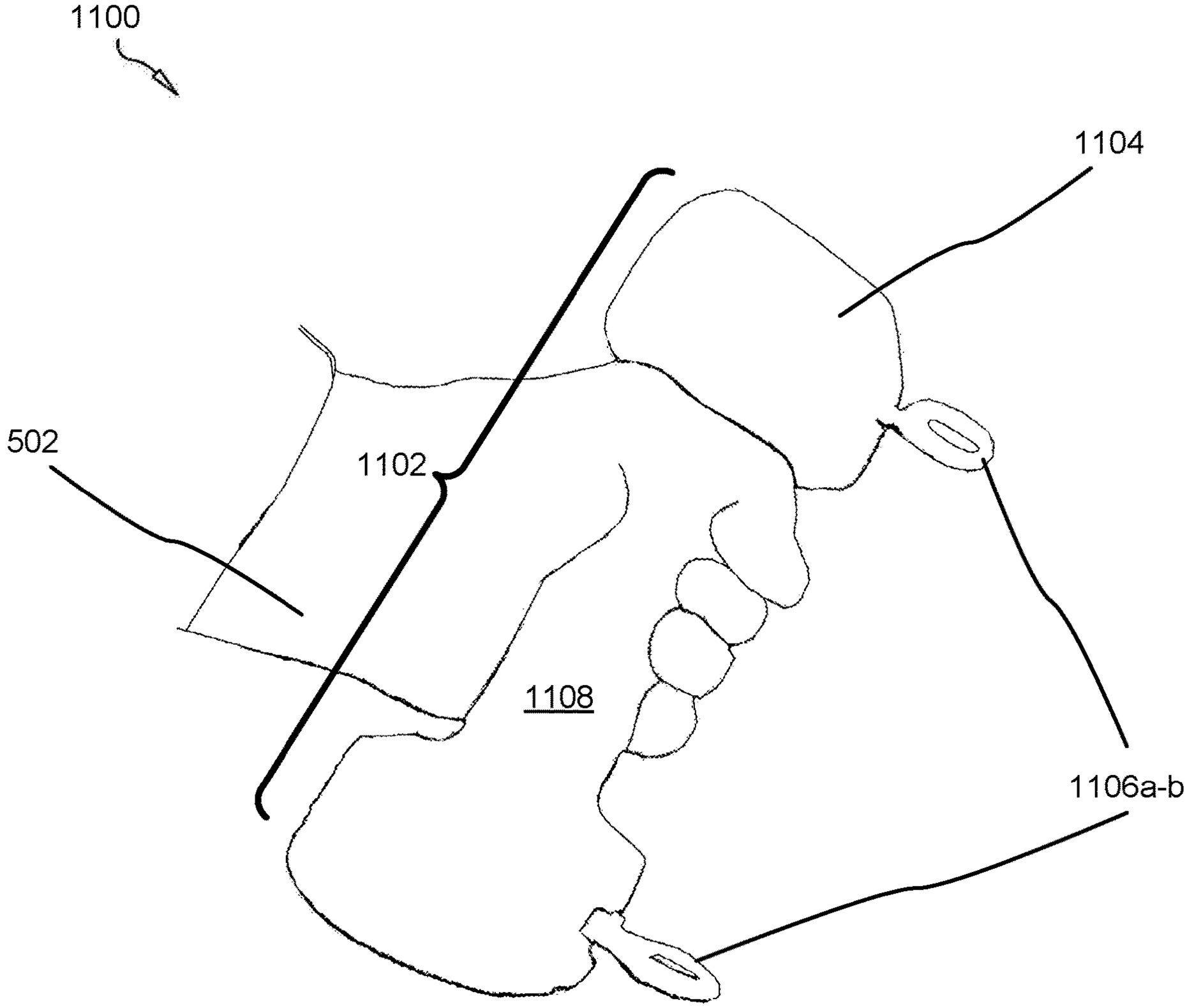


FIG. 11

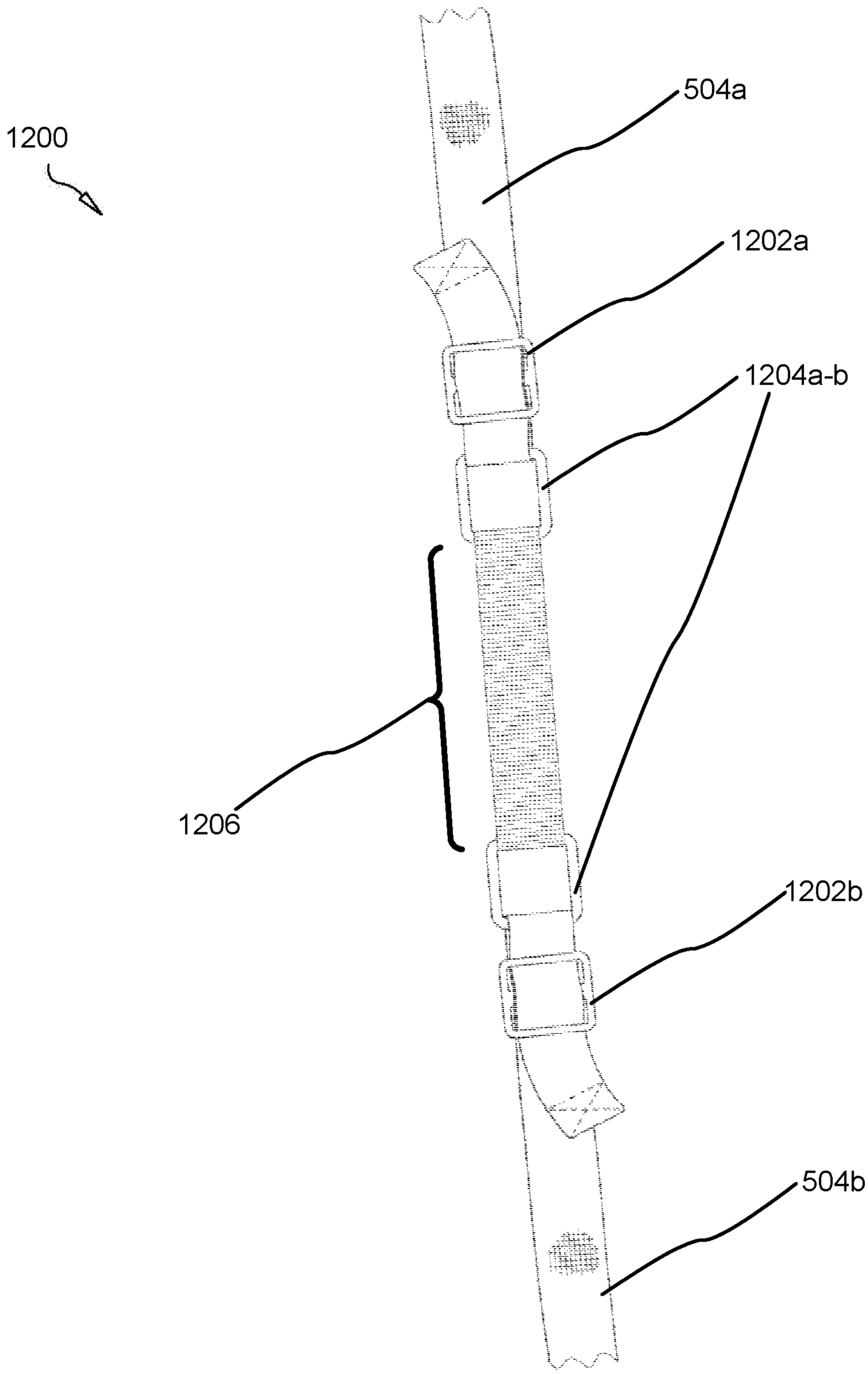


FIG. 12

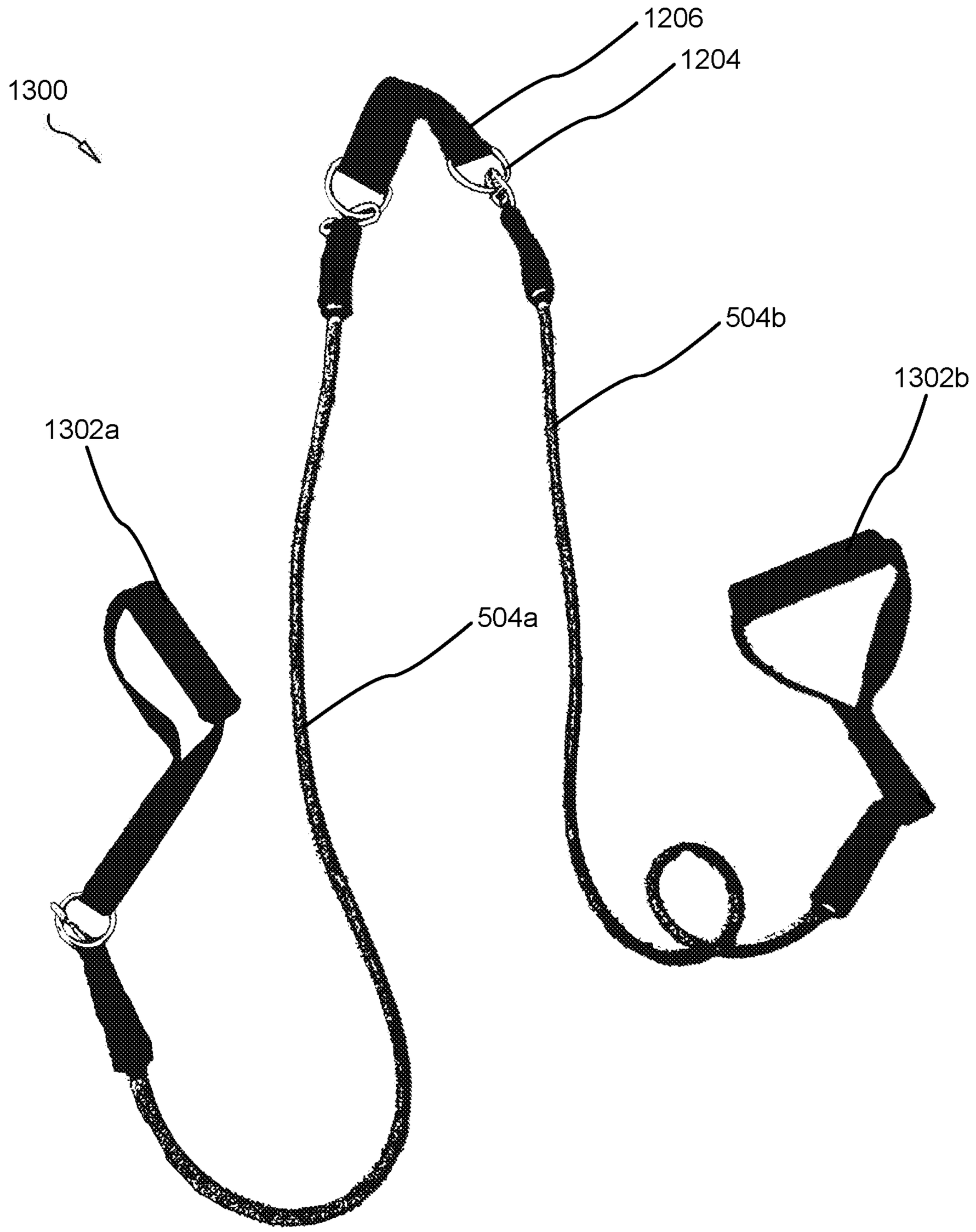


FIG. 13A

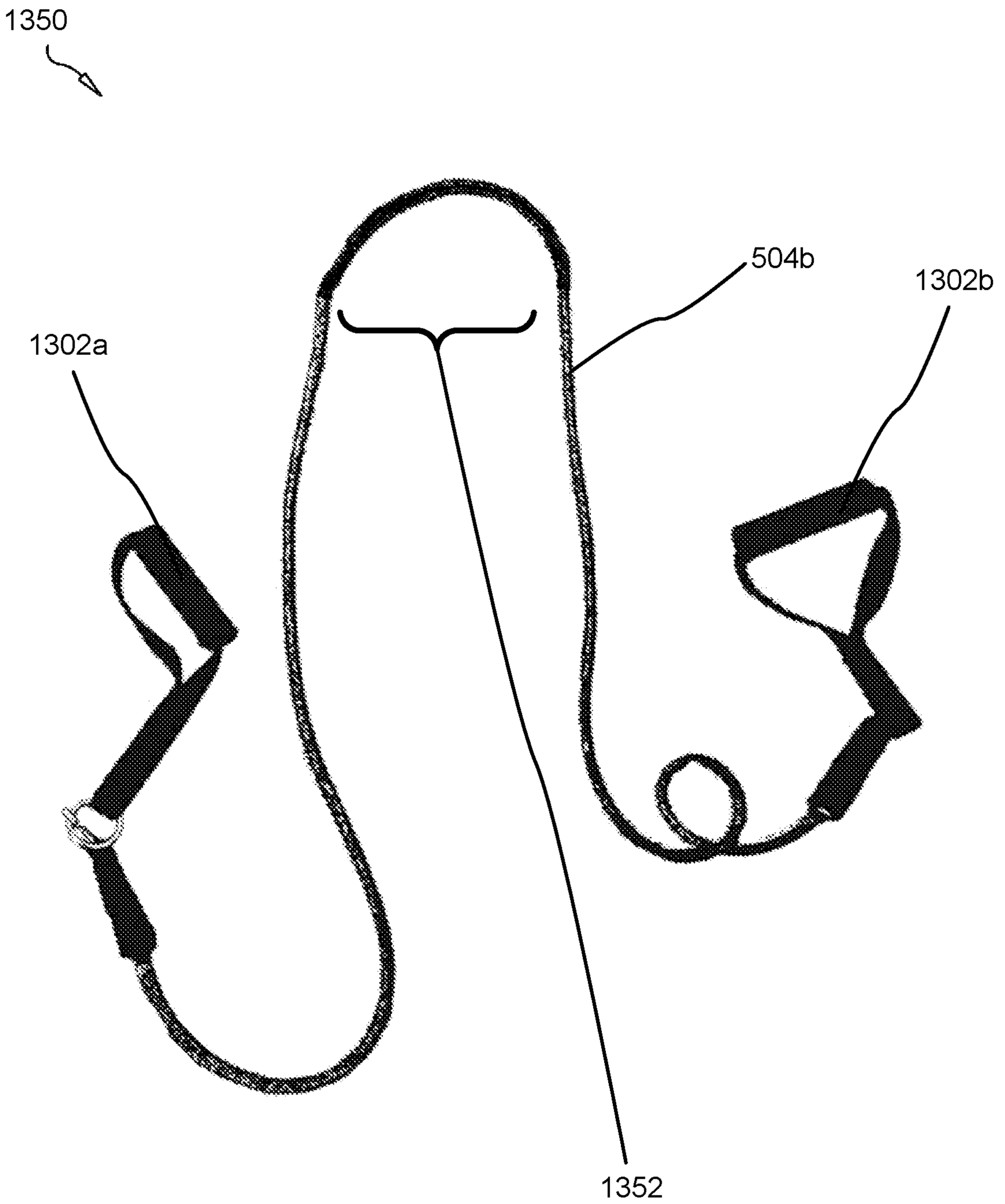


FIG. 13B

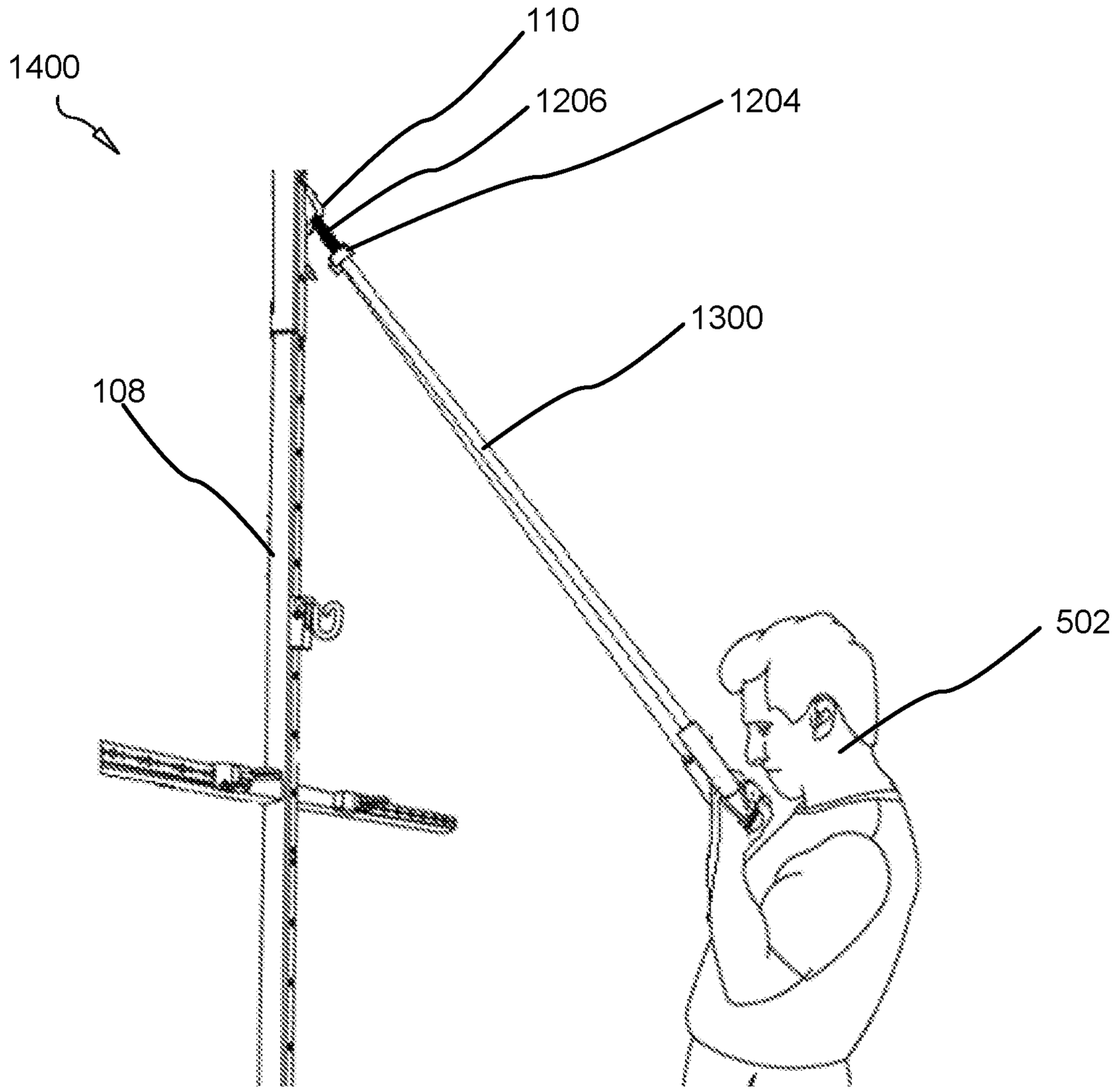


FIG. 14

STRENGTH-TRAINING APPARATUS FOR OUTDOOR USE WITH A HITCH OR GROUND RECEIVER

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to exercise devices, and more particularly relates to strength training devices and systems including resistance training bands and structure adapted to insert into a receiver of a hitch of a vehicle or a receiver recessed into a subgrade surface.

Description of the Related Art

There is an ongoing need for people to engage in regular exercise and recreation which is of well-established value to physical strength and overall health. Many and varied types of exercise devices are known in the art, including various species of resistance devices and systems available to help individuals in their efforts to improve and measure their strength and improve health issues, as well as for physical therapy. Among these devices are dumbbells, barbells, exercise machines, or fixed objects, and many systems which do not emphasize the use of grip strength or building core strength.

Most of these devices are cumbersome and impractical for porting easily. Most of them cannot be used outdoors. Conventional exercise apparati do not replicate or simulate the strength needed for real world activities.

Exercise straps are known in the art in some forms, and typically affix to an elevated structure indoors with a single strap extending downwards, sometimes with a handle.

Resistance bands are likewise known in the art and have become popular among exercisers, personal trainers and physical therapist alike, typically consisting of rubber tubing with handles on one end and a connector at the other end to secure the resistance band to an anchoring device.

There are a number of key deficiencies in these three forms of exercise straps. The present invention allows user to enjoy the benefits of exercise straps without the deficiencies in the prior art. It is therefore desirable that a strength training apparatus for outdoor use in conjunction with a hitch receiver or ground receiver as taught herein.

SUMMARY OF THE INVENTION

From the foregoing discussion, it should be apparent that a need exists for a strength training apparatus for outdoor use with a hitch or ground receiver. Beneficially, such an apparatus would overcome many of the difficulties and inefficiencies expressed above, by providing a strength training apparatus for outdoor use with a hitch or ground receiver.

The present invention has been developed in response to the problems and needs in the art that have not yet been fully solved by currently available apparati and methods. Accordingly, the present invention has been developed to provide a strength training apparatus for outdoor use comprising: an L-shaped bracket having a cantilever adapted to insert into a hitch receiver, the L-shaped bracket further comprising a vertical post affixed at a proximal end to the cantilever, the vertical post comprising a distal end and an open top end adapted to receive an upright; a cruciform adapted to insert into the open top end, the cruciform comprising an upright and one or more crossbeams; and a shuttle adapted to travel vertically on the upright, the shuttle comprises a hook adapted to detachably affix to one or more straps; one or more straps adapted to detachably affix to one or more of an anchor point and a hook; a plurality of handles affixed to the straps.

In some embodiments, the vertical post juts downwardly from the cantilever. The L-shaped bracket may comprise a plurality of anchor points circumscribing a distal end of the vertical post. The upright may comprise a plurality of anchor points circumscribing a distal end thereof.

The crossbeam may comprise two or more shuttles adapted to travel horizontally on the crossbeam. The upright may comprise a jack screw. In various embodiments, the vertical post comprises one or more jack screws. The straps may also comprise inelastic, elongated polymeric materials.

A strength training apparatus for outdoor use comprising: a cruciform adapted to insert into the open top end, the cruciform comprising an upright and one or more crossbeams affixed perpendicularly to the crossbeams; and a first shuttle adapted to travel vertically on the upright, the shuttle comprising a hook adapted to detachably affix to one or more straps; one or more secondary shuttle adapted to travel laterally on the crossbeam(s), the secondary shuttles comprising a hook adapted to detachably affix to one or more straps; one or more straps adapted to detachably affix to one or more of an anchor point and a hook; a plurality of handles affixed to the straps.

The straps may comprise elongated polymeric materials.

These features and advantages of the present invention will become more fully apparent from the following description and appended claims, or may be learned by the practice of the invention as set forth hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the advantages of the invention will be readily understood, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments that are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings, in which:

FIG. **1** is an isometric, environmental perspective view of a strength training apparatus for outdoor use with a hitch receiver in accordance with the present invention;

FIG. **2** is a top perspective view of a crossbeam of a strength training apparatus for outdoor use with a hitch or ground receiver in accordance with the present invention;

FIG. **3** is a top perspective view of a cruciform of a strength training apparatus for outdoor use with a hitch or ground receiver in accordance with the present invention;

FIG. **4** is a side perspective view of a strength training apparatus for outdoor use with a ground receiver in accordance with the present invention;

FIG. **5** is an environmental perspective view of a strength training apparatus for outdoor use with a hitch receiver in accordance with the present invention;

FIG. **6** is an environmental perspective view of a strength training apparatus for outdoor use with a hitch receiver in accordance with the present invention;

FIG. **7** is an environmental perspective view of a strength training apparatus for outdoor use with a hitch receiver in accordance with the present invention;

FIG. **8** is an environmental perspective view of a strength training apparatus for outdoor use with a ground receiver in accordance with the present invention;

FIG. **9** is a perspective view of a strength training apparatus for outdoor use in accordance with the present invention;

FIG. **10** is a perspective view of a strength training apparatus for outdoor use in accordance with the present invention;

FIG. **11** is an environmental, perspective view of a handle of a strength training apparatus for outdoor use in accordance with the present invention;

FIG. **12** is a top perspective view of a strap of a strength training apparatus for outdoor use in accordance with the present invention;

FIG. **13**A is a top perspective view of a strap of a strength training apparatus for outdoor use in accordance with the present invention;

FIG. **13**B is a top perspective view of a strap of a strength training apparatus for outdoor use in accordance with the present invention; and

FIG. **14** is an environmental perspective view of a strength training apparatus for outdoor use with a hitch or ground receiver in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Reference throughout this specification to "one embodiment," "an embodiment," or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment," "in an embodiment," and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment.

Furthermore, the described features, structures, or characteristics of the invention may be combined in any suitable manner in one or more embodiments. In the following description, numerous specific details are provided to provide a thorough understanding of embodiments of the invention. One skilled in the relevant art will recognize, however, that the invention may be practiced without one or more of the specific details, or with other methods, components, materials, and so forth. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of the invention.

It is an object of the present invention to provide a strength training apparatus for outdoor use with a hitch receiver and/or ground receiver (or receptor).

FIG. **1** is an isometric, environmental perspective view of a strength training apparatus for outdoor use with a hitch receiver in accordance with the present invention.

The hitch assembly **116** inserts into the tow bracket **104** mounted to the bottom of the vehicle **102**. The hitch assembly **116** takes the place of the trailer hitch ball which would normally insert into the tow bracket **104**. The hitch assembly **116** comprises an L-shaped bracket **106**. The L-shaped bracket **106** comprises a cantilever **114** adapted to insert into the tow bracket **104** on an automobile **102**. The L-shaped bracket **106** further comprises a vertical post **109** affixed at a proximal end to the cantilever **114**. The distal end **118** of the vertical post **109** may be adapted to rest at or near a ground or subgrade surface in some embodiments, or to hang free in other embodiments.

A plurality of anchor points **110** circumscribe the distal end **118** of the vertical post **108**. The vertical post **109** and cantilever **114** may be formed of angle iron, tubular components, or solid shafts. The vertical post **109** and cantilever **114** may be formed of steel, aluminum, titanium or alloy or polymeric materials.

The anchor points **110** may comprise steel loops affixed to the distal end **118** of the vertical post **108**. Alternatively, the anchor points **110** may comprise a plurality of bores traversing the vertical post **109**.

The L-shaped bracket **106** may also comprise one or more jack screws **112** adapted to form a friction fit with a cruciform **300**, further described below, which is adapted to insert into the open top end **124** of the L-shaped bracket **106**. The jack screws **112** may position on forward, side, or rear surfaces of the cantilever.

The apparatus **100** may comprise one or more annular, threaded skirts **134** which circumscribe a bore traversing the cantilever **114**. These annular threaded skirts **134** are adapted to receive a threaded bolt which may traverse the cantilever **114** and the hitch through the bore **136**. Alternatively, a depressible pin may substitute for the annular, threaded skirts **134** adapted to snaps into aperture **136** on the hitch receiver or ground receptor and secure the cantilever.

FIG. **2** is a top perspective view of a crossbeam **302** of a strength training apparatus for outdoor use with a hitch or ground receiver in accordance with the present invention.

The apparatus **100-500** may comprise a cross member (or crossbeam) **302**. The cross member **302** may be formed from steel, alloy, metallic or polymeric components and may be tubular or sold. In various embodiments, the cross member **302** is square as shown from a top cross-sectioned view.

A track **202** runs across a surface of the cross member **302**. The cross member **302** may be arcuate. The track **202** defines a plurality of bores **204** adapted to secure in place a shuttle **210** which travel on the track **202**. The shuttle **210** may comprise an outwardly-protruding hook **212** adapted to detachable affix to one or more straps **504** further described below. In place of straps **504**, rope, bands, elastomeric tubes, or chain may be used.

In various embodiments, the track **202** is affixed to the cross member **302**, but is some embodiments, the track **202** is formed therewith. The cross member **302** may be formed as a single integrated piece with the cruciform. The cross member **302** (i.e., crossbeam) may comprise bores **204** traversing either the track **202**, the post **206**, or both. In some embodiments, the shuttle **210** is adapted to travel up and down the post **108**.

In various embodiments, the track **202** runs from a ground surface to a predetermined upward height.

The cross member **302** may comprise one or more jack screws **208**. The cross member **302** may insert into brackets **904** or studs.

FIG. **3** is a top perspective view of a cruciform of a strength training apparatus for outdoor use with a hitch receiver or ground receiver in accordance with the present invention.

The cruciform **300** comprises the upright **108** and a crossbeam **302** which affixes perpendicularly to the upright **108**. The crossbeam **302** may comprise any rigid beam adapted to affixed using brackets, bolts, screw or other means known to those of skill in the art at, or near, a midpoint of the crossbeam **302**.

Anchor points **110** may position toward the top of the upright **108** as shown.

FIG. **4** is a side perspective view of various upright components of a strength training apparatus for outdoor use **400** in accordance with the present invention.

In various embodiments, the upright **108** (i.e. "stipes") comprises a plurality of tubular components **402**, **404**, and **804** which detachably affix together. These components **402**, **404** may telescope one from the other in some embodiments.

The upright components comprise a ground receiver **804**, which is a hollow tubular and elongated components which inserts into a ground and/or subgrade surface. The ground receiver **804** is capped at one end with an end on the opposing side. The ground receiver is positioned within a subgrade such that the open top end disposes superiorly to the capped bottom end.

The elongated component **404** slidably inserts into the open top end of the ground receiver **804** and stops when the flange **406** comes into contact with the ground receiver **804**. In this configuration, the upright component **402** rises superiorly to the remaining components above the ground surface and subgrade such that additional components forming the cruciform are attachable therewith.

FIGS. **5-6** illustrate environmental perspective views of a strength training apparatus for outdoor use with a hitch receiver **500**, **600** or ground receiver in accordance with the present invention.

In various embodiments, the apparatus **500** comprises a plurality of elongated straps **504** formed from flexible, polymeric, inelastic or elastic material(s). These straps **504** are adapted to selectively affix to any of the anchor points **110**, the shuttle **210**, or the crossbeam **302**. A user **502** exercises using the apparatus **500**. Handles **506** may affix to distal ends of the straps **504** for use in performing various exercises.

In various embodiments, the apparatus **500** includes a cross strap **504***c* adapted to pull the strap **504** inwardly.

As shown in FIG. **6**, the crossbeam **302** may also comprise a plurality of tracks **202***b-c* upon which additional shuttles **210***b-c* travel. Like shuttle **210***a*, shuttles **210***b-c* may travel on the crossbeam **302** itself rather than tracks **202***b-c*. The shuttles **210***b-c* comprise hooks **212** for anchoring straps **504**.

In some embodiments, the apparatus **600** comprises a plurality of crossbeams **302**.

FIG. **7** is an environmental perspective view of a strength training apparatus for outdoor use with a hitch receiver **700** in accordance with the present invention.

As shown, straps **504** may affix to anchor points **110** at a top/distal end of the upright **108**.

FIG. **8** is an environmental perspective view of a strength training apparatus **800** for outdoor use in accordance with the present invention.

The apparatus **800** comprises an upright **108** (or upright) joined to a track **202**. Anchor points **110** position at the top of the upright **108** and may also position on the lower half of the upright **108**, as well as at lateral (or distal ends) of the crossbeam(s) **302**.

In the shown embodiment, the upright **108** inserts into a ground or subgrade **802** surface. The upright **108** may position within a tubular, rectangular, receiver within the ground or the upright **108** may be affixed to a stud **402** which inserts into the ground receptor **804**. The upright **108** and stud **402** may be formed as a single integrated piece.

In various embodiments, the track **202** is oriented perpendicularly to the crossbeam(s) **302** and overlaps the same on the upright **108**.

In various embodiments, a rectangular receiver **804** positions within the ground surface configured to receive one of the upright **108**, the stud **402**, and/or the cruciform. The receiver **804** may jut upwardly slightly from the ground surface **802**.

FIG. **9** is a perspective view of a strength training apparatus for outdoor use **900** in accordance with the present invention.

In various embodiments, the apparatus **900** comprises a plurality of crossbeams **902** which insert into a bracket **904** affixed to, or welded to, the upright **108**. The brackets may also be called studs. In various embodiments, the bracket **904** defines one or more lateral recesses **906** for receiving the crossbeams **902**. These lateral recesses may be defined by studs jutting laterally from the upright **904**.

FIG. **10** is a perspective view of a strength training apparatus for outdoor use **1000** in accordance with the present invention.

In various embodiments, tracks **1002** affix to a forward surface of the crossbeam(s) **902**.

FIG. **11** is an environmental perspective view of a handle **1100** of a strength training apparatus for outdoor use in accordance with the present invention.

In various embodiments, the handle **1100** comprises a dumbbell **1102**, or any weighted handles, having weighted upper and lower terminal ends **1104** as shown. The handle **1100** comprises, or consists of, two attachment points **1106***a-b*, which are both affixed on the peripheral outer edge of a terminal end **1104** such that the attachment points **1106***a-b* are in parallel with each other and a center shaft **1108** of the handle **1100** interconnecting the terminal ends **1104**. The attachment points **1106** comprise uninterrupted loops adapted to detachable affix to the straps **504**.

FIG. **12** is a top perspective view of a strap **1200** of a strength training apparatus for outdoor use in accordance with the present invention.

In various embodiments, the strap **504** is partitioned into two halves **504***a-b* and an intermediate strap **1206** which is positioned between the straps **504***a* and **504***b*. This intermediate strap **1206** is detachable using D-rings **1204**, carabiners, or other fasteners known to those of skill in the art. The intermediate strap **1206** is meant to be detachable and disposable. In some variations a cross strap affixes to an anchor point **110** on the apparatus **100-500** at a proximal end. The distal end of the cross strap may slidably affix to the intermediate strap **1206**. The cross strap may travel up and down along the length of the intermediate strap **1206** such that the intermediate strap **1206**, rather than the strap **504**, is adapted in some embodiments to withstand the friction and wear caused by the cross strap **504** acting upon it. The intermediate strap **1206** may be formed from polymeric materials or organic materials such as leather. The intermediate strap **1206** may be formed from materials with low friction surfaces adapted to allow the cross strap **504** to travel freely on the intermediate strap **1206** or textured surfaces adapted to prevent travel (and wear) of the cross strap **504** against the intermediate strap **1206**.

FIG. **13**A is a top perspective view of a strap **1300** of a strength training apparatus for outdoor use in accordance with the present invention.

The strap **1300** comprises an intermediate strap **1206** attached at both terminal ends to straps **504***a-b*. Handles **1302***a-b* dispose at the terminal ends of the straps **504***a-b*. The straps **504***a-b* may comprise elastic tubing as shown.

FIG. **13**B is a top perspective view of a strap **1350** of a strength training apparatus for outdoor use in accordance with the present invention.

Unlike strap **1300**, strap **1350** is a single, elongated, flexible strap or tube affixed at distal and proximal ends to

handles **1302**. The strap **1350** in this embodiment comprises a flexible sleeve **1352** circumscribing a medial portion of the strap **1350**. This flexible sleeve **1350** may be slipped onto the strap **1350**, heat-pressed onto the strap **1350**, threaded onto the strap **1350**, or otherwise applied using means known to those of skill in the art. In some embodiments, the flexible sleeve **1350** is a polymeric coating and/or adhesive which is applied to the strap **1350**. In various embodiments, the flexible sleeve is formed from polymeric or organic materials, such as nylon or leather.

FIG. **14** is an environmental perspective view of a strength training apparatus **1400** for outdoor use with a hitch or ground receiver in accordance with the present invention.

In various embodiments, the intermediate strap **1206** positions within an anchor point **110** or shuttle **210** and is adapted to prevent wear occasioned by the anchor point **110** on the intermediate strap **1206**.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A strength training apparatus for outdoor use comprising:

an L-shaped bracket having a cantilever adapted to insert into a hitch receiver on an automobile, the L-shaped bracket further comprising:

a vertical post affixed at a proximal end to the cantilever, the vertical post comprising a distal end and an open top end adapted to receive an upright;

one or more jackscrews adapted to form a friction fit with a cruciform;

a cruciform adapted to insert into the open top end, the cruciform comprising an upright and one or more crossbeams, each of the one or more crossbeams comprising a track spanning the one or more crossbeams within which a shuttle travels;

a second shuttle adapted to travel vertically on the upright, the second shuttle comprising a hook adapted to detachably affix to one or more straps;

one or more straps adapted to detachably affix to one or more of an anchor point and a hook;

a plurality of handles affixed to the one or more straps.

2. The strength training apparatus of claim **1**, wherein the vertical post juts downwardly from the cantilever.

3. The strength training apparatus of claim **1**, wherein the L-shaped bracket comprises: a plurality of anchor points circumscribing a distal end of the vertical post, the anchor points comprising steel loops; and one or more annular threaded skirts.

4. The strength training apparatus of claim **1**, wherein the upright comprises a plurality of anchor points circumscribing a distal end thereof.

5. The strength training apparatus of claim **1**, wherein the one or more crossbeams comprises two or more shuttles adapted to travel horizontally on the one or more crossbeams.

6. The strength training apparatus of claim **1**, wherein the upright comprises one or more jack screws.

7. The strength training apparatus of claim **1**, wherein:

the vertical post comprises one or more jack screws; and

the crossbeam and track spanning the one or more crossbeams are formed as a single, integrated piece.

8. The strength training apparatus of claim **1**, wherein the one or more straps comprise elongated polymeric materials.

9. A strength training apparatus for outdoor use comprising:

a tubular ground receiver comprises an elongated metal alloy tube adapted to be recessed into a subgrade surface, the ground receiver having a closed bottom end and an open top end adapted to receive an upright of a cruciform;

a cruciform adapted to insert into the open top end, the cruciform comprising an upright and one or more crossbeam(s);

wherein the one or more crossbeams each comprises a shuttle adapted to travel horizontally on the one or more crossbeam(s);

a second shuttle adapted to travel vertically on the upright, the second shuttle comprises a hook adapted to detachably affix to one or more straps;

one or more straps adapted to detachably affix to one or more of an anchor point and a hook;

a plurality of handles affixed to the one or more straps; and

wherein the upright comprises a plurality of anchor points circumscribing a distal end thereof.

* * * * *