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Figueroa

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(54) **ADJUSTABLE IMPACT WRENCH AND GROUND ANCHOR ASSEMBLY**

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E02D 5/80	(2006.01)
E02D 7/06	(2006.01)

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See application file for complete search history.

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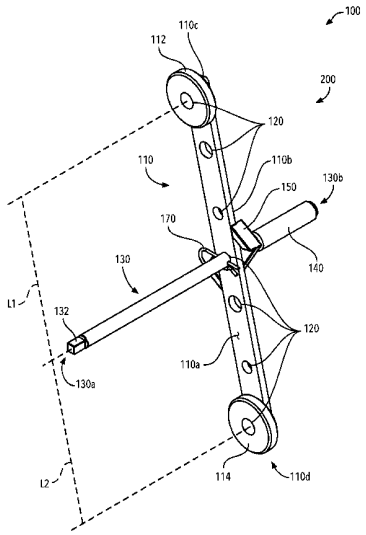
(57) **ABSTRACT**

An adjustable impact wrench and ground anchor assembly including a torque bar having a plurality of apertures disposed therein, where the plurality of apertures have a first and second diameter, a wrench shaft having a first and second end, a chuck arranged at the first end, a handle arranged at the second end, where the wrench shaft is arranged to engage one of the first diameter apertures of the plurality of apertures therein, a clamp, said clamp arranged to accept said wrench shaft through an aperture disposed therein, a pin arranged to engage a pin aperture of the wrench shaft and is further arranged to sandwich the torque bar between the pin and the clamp, a plurality of spikes arranged to engage the second diameter of apertures of the plurality of apertures, and a clip arranged to engage one of a pair of end apertures of the plurality of apertures.

19 Claims, 10 Drawing Sheets



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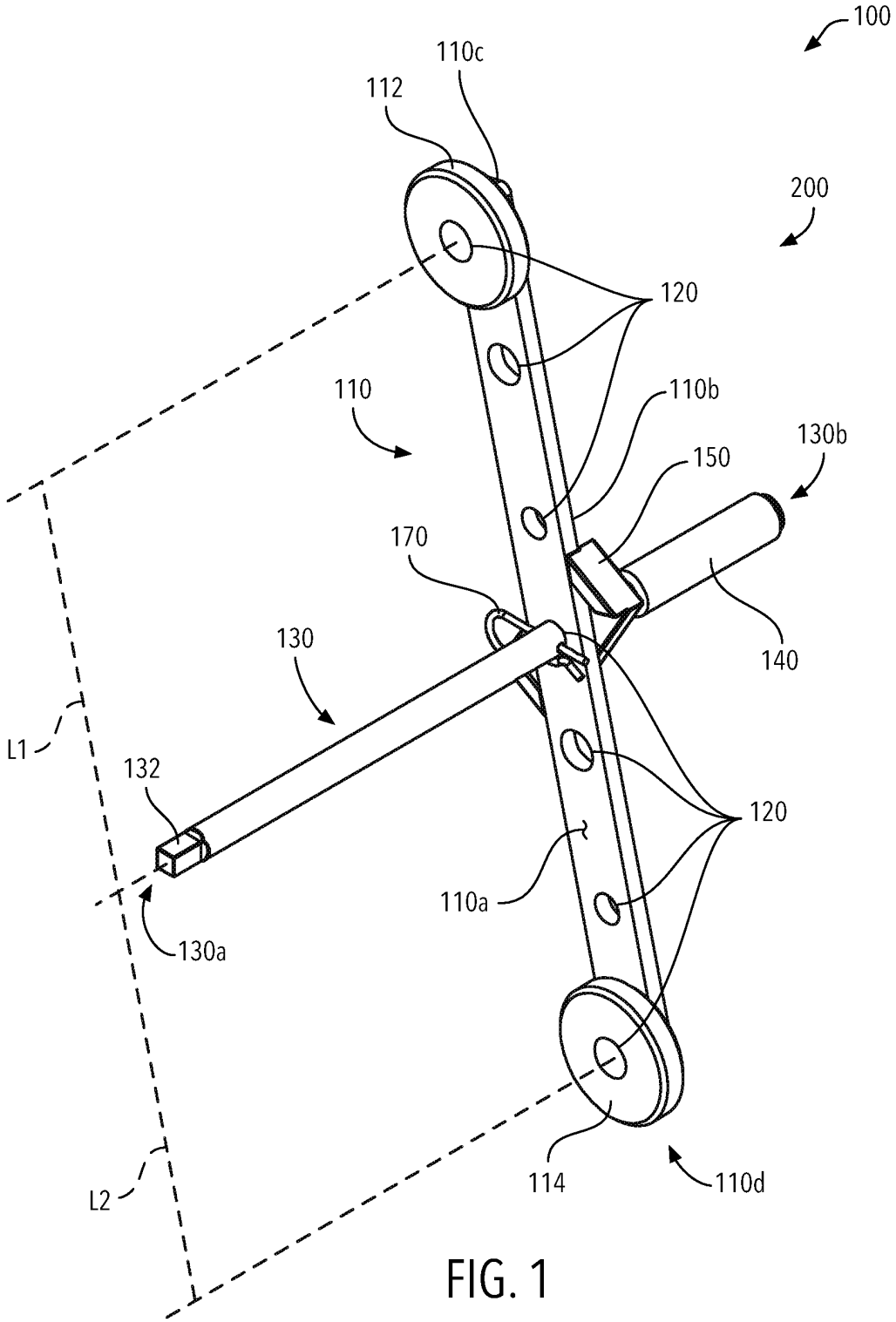
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110c
112
200
120
110
110b
130b
150
170
130
140
L1
132
120
110a
130a
L2
114
110d

FIG. 1

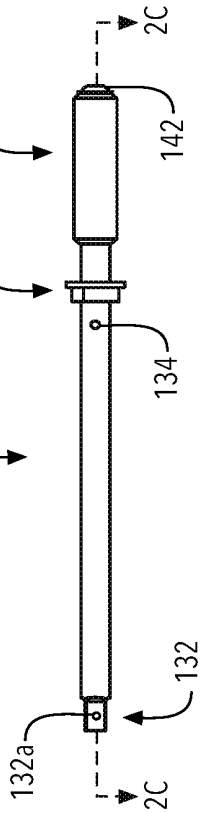


FIG. 2B

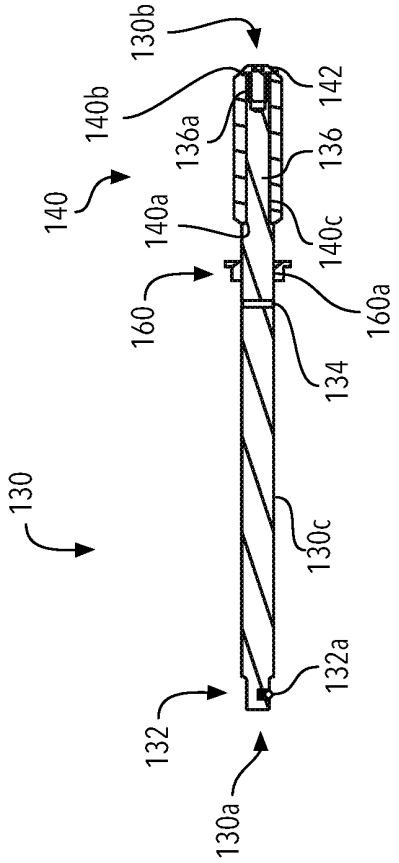


FIG. 2C

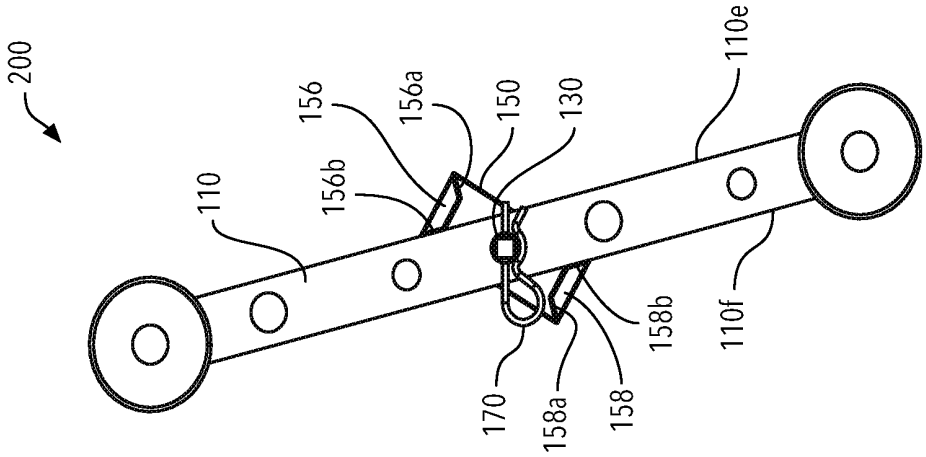
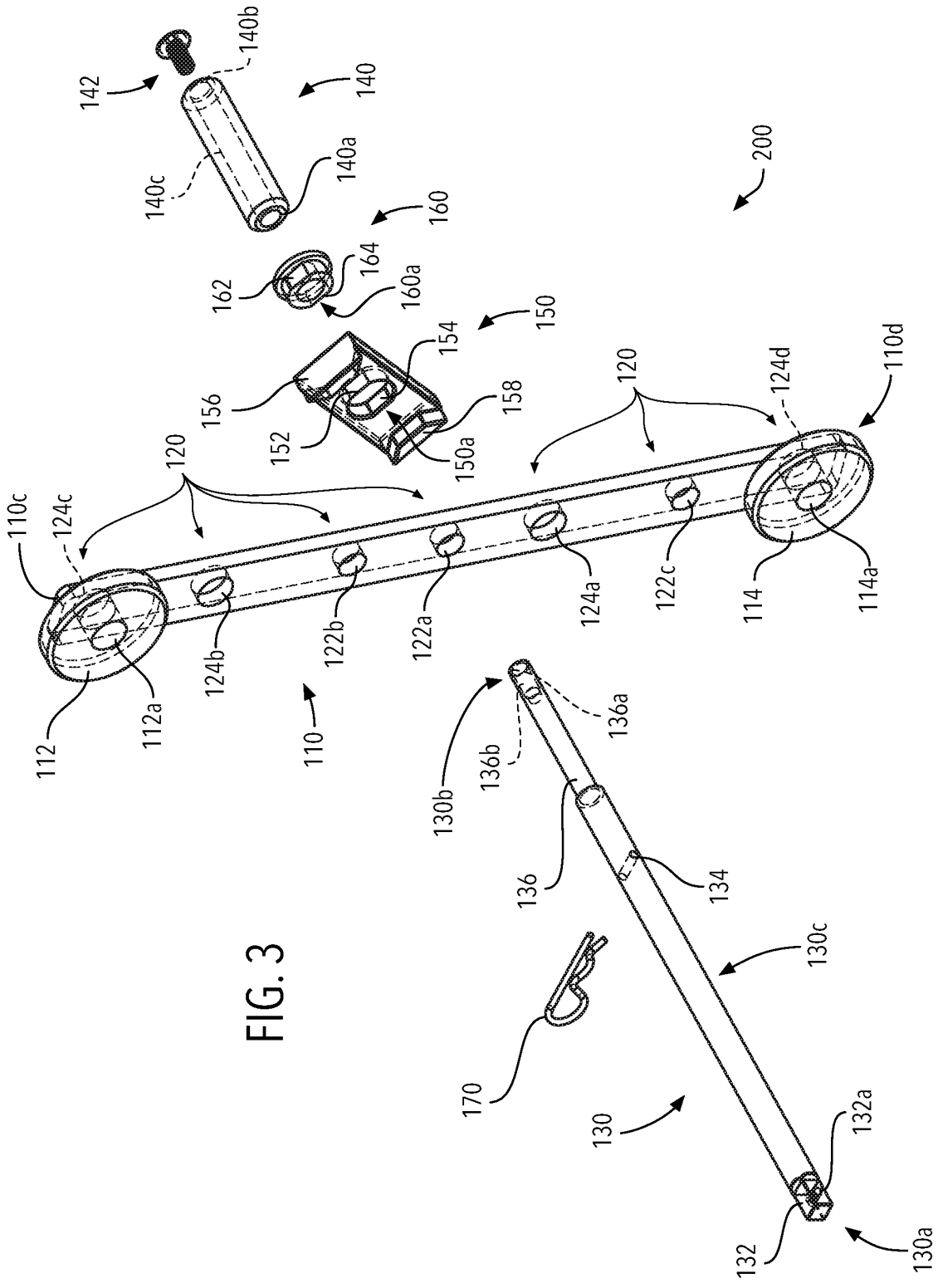


FIG. 2A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140b
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140c
140a
160
162
164
160a
150
154
156
152
158
150a
200
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110d
110c
124c
120
122b
122a
124a
122c
114
114a
124b
112a
112
110
136a
130b
136b
136
134
130c
170
130
132a
132
130a

FIG. 3

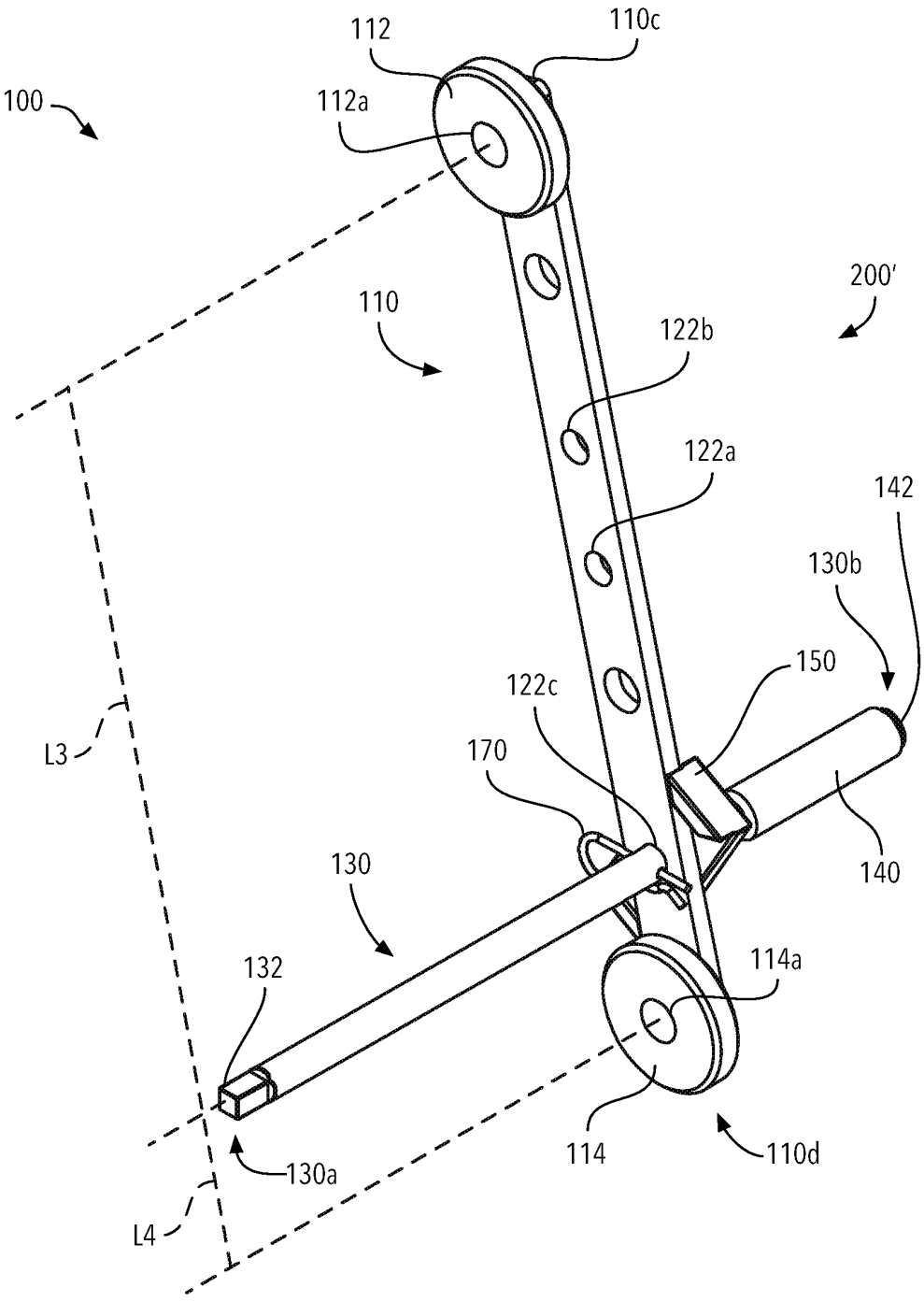

112
110c
100
112a
200'
110
122b
122a
142
130b
150
122c
L3
170
130
140
132
114a
114
110d
130a
L4

FIG. 4

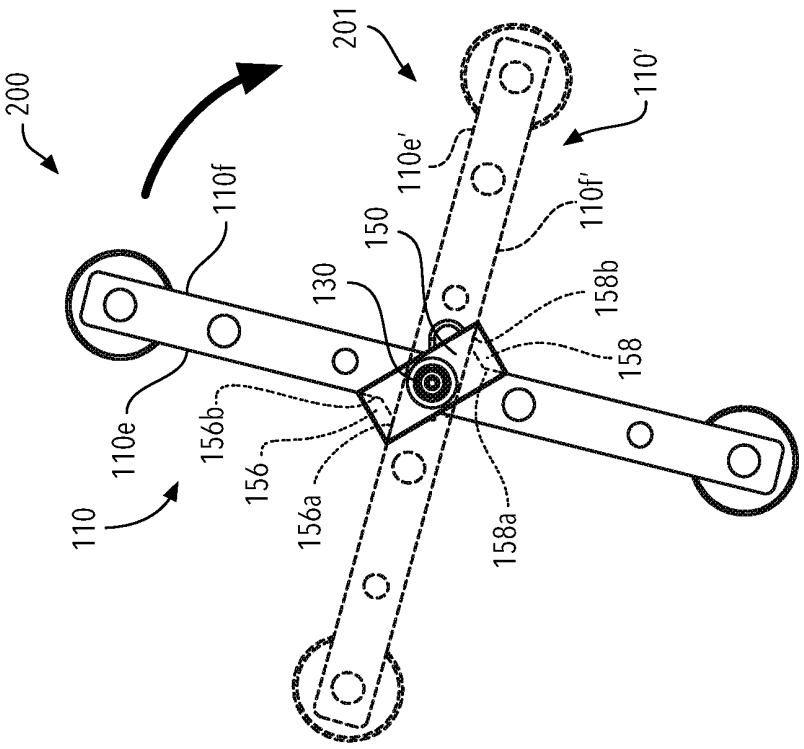
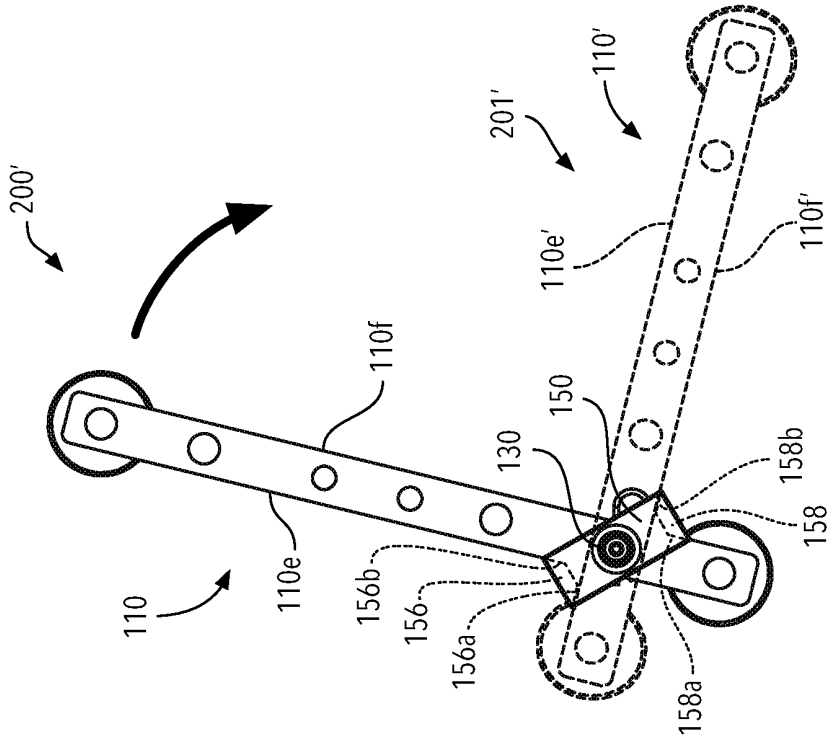

200
201
110'
110e'
110f'
150
130
158b
158
110f
110e
156b
156
156a
158a
110

FIG. 5B


200'
201'
110'
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110f'
150
130
158b
158
110f
110e
156b
156
156a
158a
110

FIG. 5A

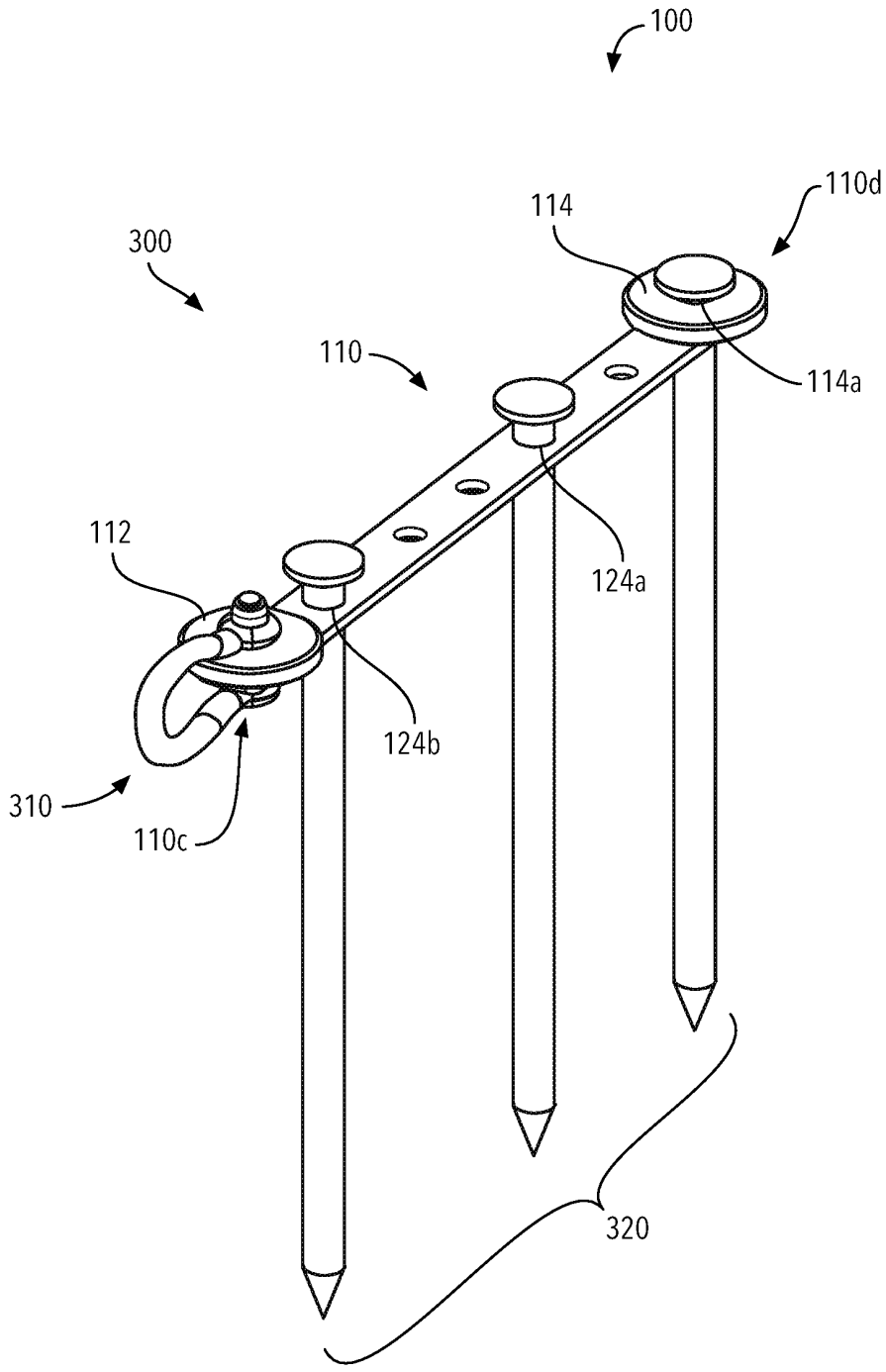


FIG. 6

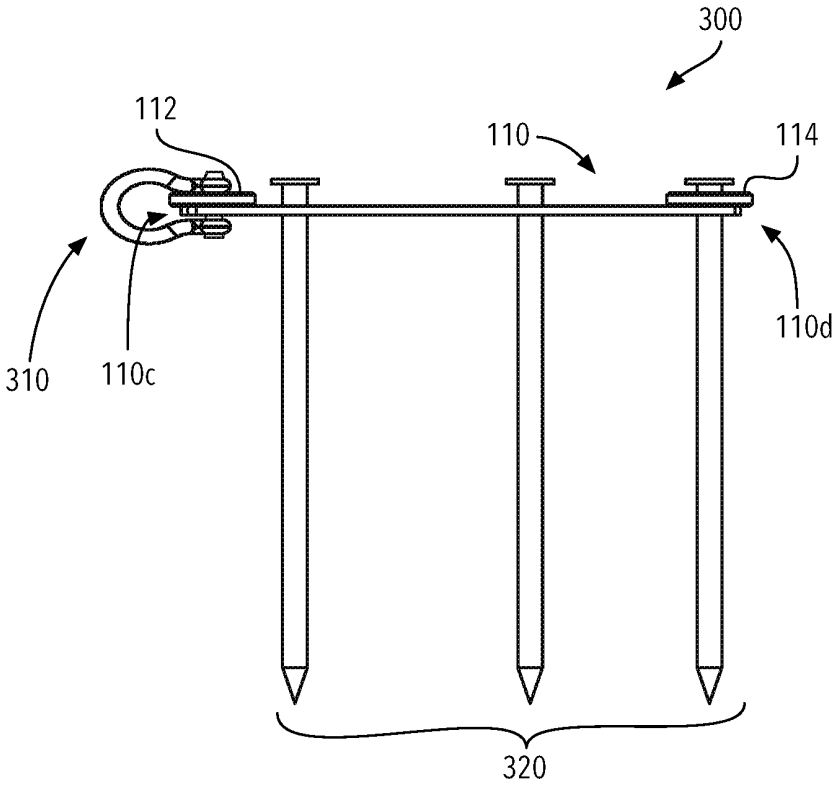


FIG. 7A

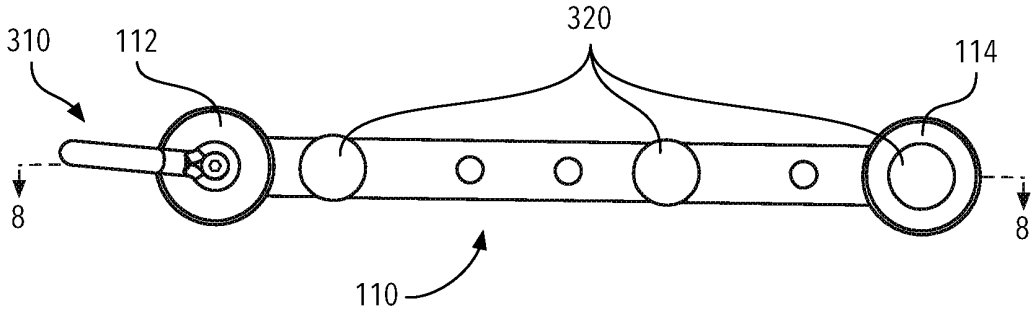
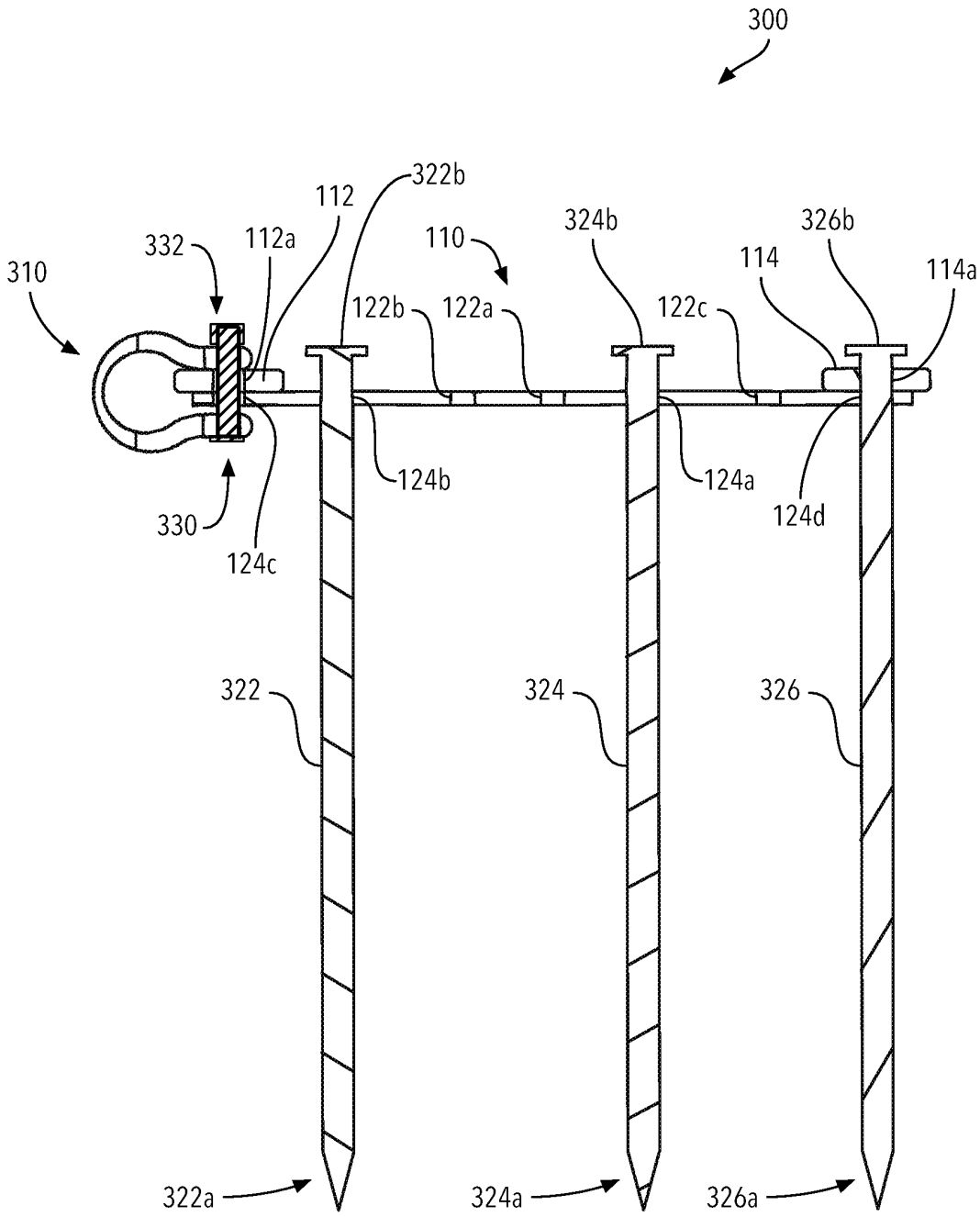


FIG. 7B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322b
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332
112a
110
324b
326b
310
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122a
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124a
124d
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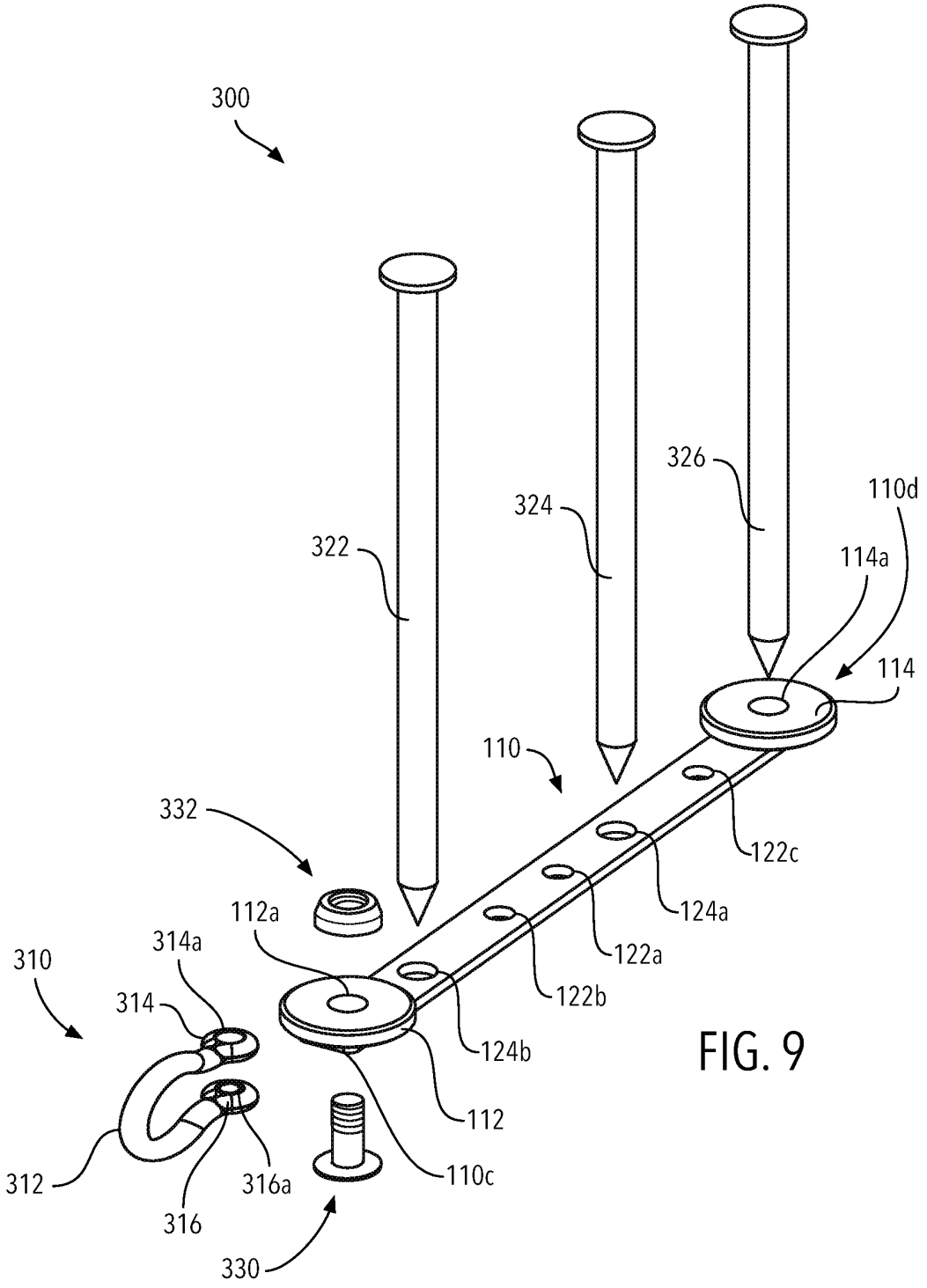
124c
322
324
326
322a
324a
326a

FIG. 8


300
322
324
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110d
114a
114
110
332
122c
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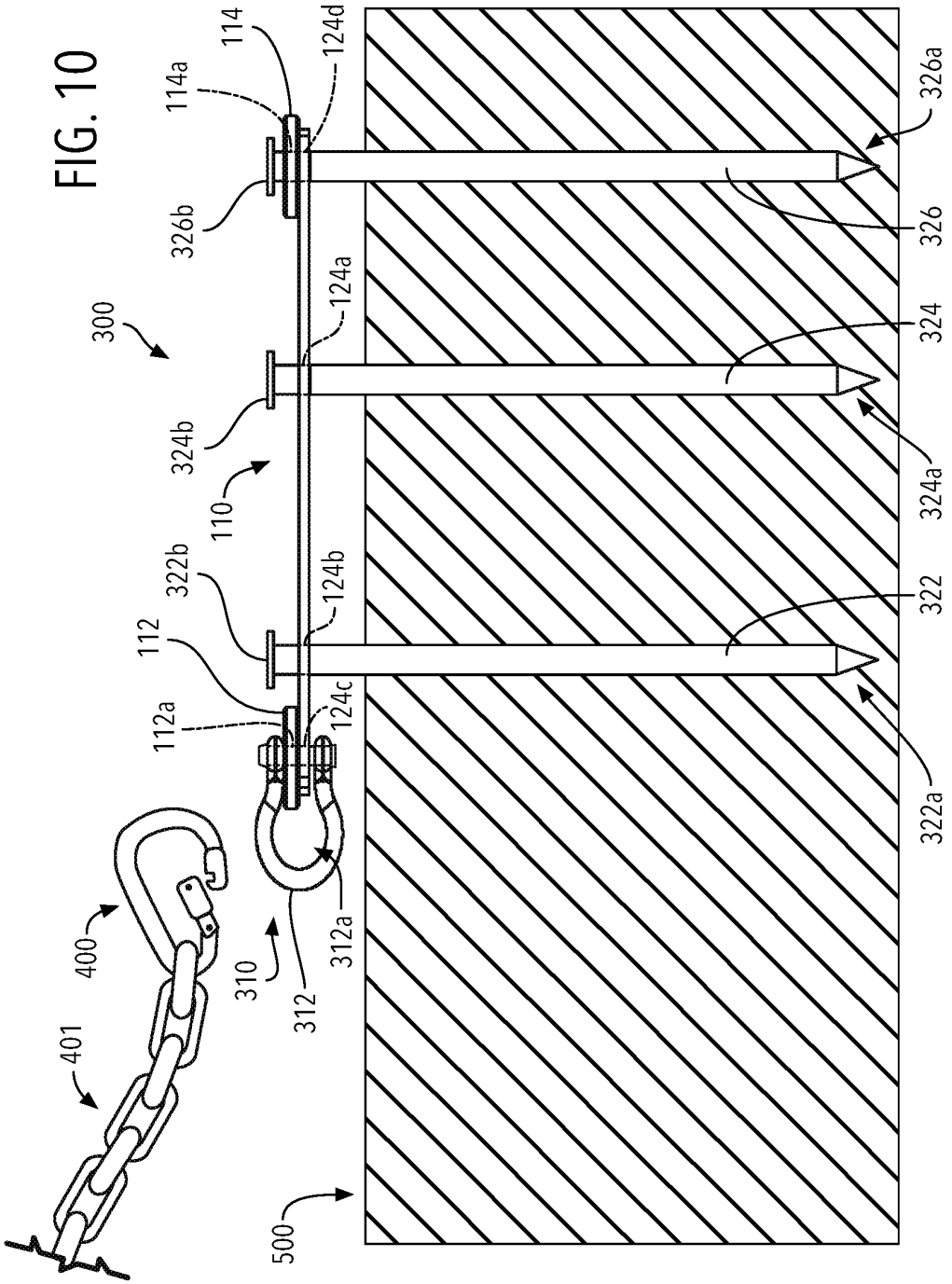
122a
122b
112a
314a
310
314
124b
112
110c
312
316a
316
330

FIG. 9

FIG. 10


114
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326a
326b
326
124a
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324a
110
322b
124b
322
112
112a
124c
322a
400
310
312a
312
401
500

ADJUSTABLE IMPACT WRENCH AND GROUND ANCHOR ASSEMBLY

FIELD

The present invention relates generally to an adjustable impact wrench and ground anchor assembly, specifically to a collapsible and adjustable impact wrench, and a ground anchor having a plurality of removable ground spike disposed therein.

BACKGROUND

In a previously known adjustable impact wrench device, the device includes a shaft with a handle in one end and a socket in the opposite end, whereby the shaft between its ends is provided with a hub about which is rotatably arranged about an impact arm which carries weights and is arranged to transfer impact movement to the shaft via stops arranged at the hub, in connection to the hub are arranged members which limit the ability of the impact arm to transfer movement to the shaft which carries the socket in one direction of movement of the impact arm. The device also includes an arm/bar with a plurality of holes and a weight at each end.

Another previously known impact wrench device provides for a manually operated tool wherein the inertia of weights on a rotatable cross arm is efficiently utilized to loosen or tighten screw threaded parts, such as nuts or bolts; and wherein the blow struck by a weighted arm is positively directed and is converted into a turning moment of a spindle adapted to turn the nut or bolt. The device discloses an arm/bar with a hole and a weight at each end.

A previously known ground anchor system includes a base plate having a top surface and a substantially planar bottom surface, where the base plate has a plurality of picket-guide apertures formed therein between the top surface and the substantially planar bottom surface. At least one picket is removably positioned in at least a portion of the picket-guide apertures. An anchor portion is formed at a first end of the base plate, wherein the anchor portion has an anchor aperture formed through the first end of the base plate, the anchor portion further comprising a ground face surface proximate to the anchor aperture, wherein a distance between the top surface and the ground face surface is less than a distance between the top surface and the substantially planar bottom surface. The previous ground anchor system also includes a plurality of holes which vary in sizes disposed along the bar. The bar also includes an end-link connection device which is connected to a terminal end of the bar.

Prior ground anchor devices commonly utilize spikes that can be inserted into the ground surface to anchor the ground anchor's plate thereto. In some attempts, the spikes are inserted into the ground perpendicular to the ground anchor's plate. In other attempts, the spikes include threading and require not only to be threaded into the plate, but also into the ground.

However, the aforementioned tools are two separate tools, where, even if the two tools are collapsible, i.e., can be disassembled, the two devices will require more storage than a singular tool.

Thus, there is a long-felt need for a combination tool having an adjustable impact wrench and ground anchor assembly that is collapsible for storage.

There is another long-felt need for an impact wrench having an adjustable moment by inserting the wrench portion into a non-centrally located aperture disposed within a torque bar of the impact wrench.

There is a further long-felt need for a ground anchor device that allows a plurality of stakes to be inserted within a torque bar to mount the ground anchor device to the ground, where the ground anchor device can also be configured into an adjustable impact wrench.

There is still a long-felt need for a ground anchor device that allows a plurality of stakes to be inserted within a torque bar at an angle to increase the resistance to the ground therebelow.

Additionally, there is a long-felt need for a ground anchor device that includes a torque bar, which ground spikes and connecting means can be removed therefrom, where the torque bar can accept a wrench device therein to change the ground anchor device into an adjustable impact wrench.

SUMMARY

The present invention generally comprises a combination tool having an adjustable impact wrench functionality and a ground anchor functionality. The combination tool includes a torque bar with a plurality of apertures disposed therein, the apertures arranged to either accept a wrench device within one of the plurality of apertures, secured by a pin and a clamp, or to accept a plurality of ground spikes therein and a connecting means therein.

The present invention broadly comprises an adjustable impact wrench and ground anchor assembly including a torque bar having a first end and a second end, the torque bar having a first set of a plurality of apertures disposed therein and a second set of a plurality of apertures disposed therein, each aperture in the first set having a first diameter and each aperture in the second set having a second diameter, where the first diameter is less than the second diameter, a wrench shaft, the wrench shaft having a first end and a second end, the wrench shaft having a chuck arranged at the first end, the wrench shaft having a removable handle arranged at the second end, the wrench shaft arranged to be seated within one of the first diameter apertures of the plurality of apertures, a clamp, the clamp arranged to accept the wrench shaft through an aperture disposed therein, a pin, the pin arranged to engage a pin aperture of the wrench shaft and further arranged to sandwich the bar between the pin and the clamp, a plurality of spikes, each one of which spikes is arranged to engage at least one of an aperture of the second set of apertures, where each one of the plurality of spikes has a third diameter which is greater than the first diameter, and a clip, the clip arranged to engage one of a pair of end apertures of the plurality of apertures.

The present invention also generally comprises an adjustable impact wrench and ground anchor assembly including a torque bar having a first, a second end, and a plurality of apertures comprising a first set and a second set disposed therein, where the first set of apertures have a first diameter and the second set of apertures have a second diameter, where the first diameter is less than the second diameter, the torque bar having an adjustable impact wrench configuration whereby the torque bar is arranged to accept a wrench shaft within one of the first set of the plurality of apertures, the wrench shaft secured within one of the plurality of apertures of the first diameter via a clamp arranged on the wrench shaft and a pin arranged to engage the wrench shaft, and the torque bar having a ground anchor configuration whereby the torque bar is arranged to accept at least one spike of a plurality of spikes within at one of the second set of the plurality of apertures, each of the plurality of spikes have a

diameter greater than the first diameter and less than the second diameter, the torque bar further arranged to accept a clip within one of a pair of end apertures of the second set of the plurality of apertures, the pair of end apertures arranged proximate to the respective first and second ends of the torque bar.

Further, the present invention also generally comprises an adjustable impact wrench and ground anchor assembly including a wrench shaft, a plurality of spikes, and a torque bar having a plurality of apertures, wherein at least two of the plurality of apertures are of different sizes, wherein the wrench shaft is arranged to engage with at least one of the plurality of apertures of the torque bar, wherein each of the plurality of spikes may pass through and engage at least one of the at least two of the plurality of apertures but not pass through and engage at least one other of the at least two of the plurality of apertures.

The adjustable impact wrench of the present invention generally is configured to have an adjustable moment, where the adjustable moment is determined by which of the plurality of apertures of the first diameter functions as the fulcrum of the wrench, i.e., when the wrench shaft is inserted therein.

The adjustable impact wrench of the present invention also generally includes a chuck arranged on the first end of the wrench shaft where the chuck is arranged to accept a socket thereon.

The plurality of spikes of the ground anchor configuration of the present invention generally each have a diameter that is greater than the diameter of the apertures of the first diameter of the plurality of apertures but is less than the diameter of the apertures of the second diameter of the plurality of apertures, where each of the plurality of spikes have an end cap arranged on one end, where the end cap of each of the plurality of spikes has a diameter that is greater than the diameter of the apertures of the second diameter of the plurality of apertures. In other words, in a preferred embodiment, the each of the plurality of ground spikes will not fit within the apertures of the first diameter of the plurality of apertures of the torque bar.

A primary object of the present invention is to provide a combination tool having an adjustable impact wrench and ground anchor assembly that is collapsible for storage.

Another object of the present invention is to provide an impact wrench having an adjustable moment by inserting the wrench portion (i.e., fulcrum) into one of the apertures of the first diameter of the plurality of apertures within the torque bar of the impact wrench.

A further object of the present invention is to provide a ground anchor device that allows a plurality of stakes to be inserted within a torque bar to mount the ground anchor device to the ground, where the ground anchor device can also be configured into an adjustable impact wrench.

A still further object of the present invention is to provide a ground anchor device that includes a torque bar, which ground spikes and connecting means can be removed therefrom, where the torque bar can accept a wrench device therein to change the ground anchor device into an adjustable impact wrench, or alternatively, an adjustable impact wrench having an adjustable moment by inserting the wrench shaft (i.e., the fulcrum) into a non-centrally located aperture disposed within a torque bar of the impact wrench, which wrench portion can be removed from the torque bar, where the torque bar can accept a plurality of spikes within a plurality of apertures along with a connecting means to change the adjustable impact wrench into a ground anchor assembly.

An even further object of the present invention to provide for an adjustable impact wrench that is arranged to accept a socket on a chuck disposed on an end of a wrench shaft, where the socket is arranged to be seated on and around a lug nut, or other like nut, where the adjustable impact wrench is arranged to be rotated to tighten the lug nut, or other like nut, engaged to the chuck.

These and other objects, features, and advantages of the present disclosure will become readily apparent upon a review of the following detailed description of the disclosure, in view of the drawings and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments are disclosed, by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts, in which:

FIG. **1** is a perspective view of the adjustable impact wrench configuration of the present invention;

FIG. **2**A is a front view of the adjustable impact wrench shown in FIG. **1**;

FIG. **2**B is a right-side view of the wrench shaft of the adjustable impact wrench shown in FIG. **1**;

FIG. **2**C is a cross-sectional view taken generally along line **2**C-**2**C shown in FIG. **2**B;

FIG. **3** is an exploded view of the adjustable impact wrench shown in FIG. **1**;

FIG. **4** is a perspective view of the adjustable impact wrench shown in FIG. **1**, shown in a different configuration than that shown in FIG. **1**;

FIG. **5**A is a rear view of the adjustable impact wrench shown in FIG. **4**;

FIG. **5**B is a rear view of the adjusted adjustable impact wrench shown in FIG. **1**;

FIG. **6** is a perspective view of the ground anchor configuration of the present invention;

FIG. **7**A is a right-side view of the ground anchor configuration shown in FIG. **6**;

FIG. **7**B is a top plan view of the ground anchor configuration shown in FIG. **6**;

FIG. **8** is a cross-sectional view of the ground anchor configuration, taken generally along line **8**-**8** in FIG. **7**B;

FIG. **9** is an exploded perspective view of the ground anchor configuration shown in FIG. **6**; and,

FIG. **10** is a right side view of the ground anchor configuration shown in use, with the spikes secured within the ground.

DETAILED DESCRIPTION

At the outset, it should be appreciated that like drawing numbers on different drawing views identify identical, or functionally similar, structural elements. It is to be understood that the claims are not limited to the disclosed aspects.

Furthermore, it is understood that this disclosure is not limited to the particular methodology, materials and modifications described and as such may, of course, vary. It is also understood that the terminology used herein is for the purpose of describing particular aspects only and is not intended to limit the scope of the claims.

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood to one of ordinary skill in the art to which this disclosure pertains. It should be understood that any meth-

ods, devices or materials similar or equivalent to those described herein can be used in the practice or testing of the example embodiments.

It should be appreciated that the term "substantially" is synonymous with terms such as "nearly," "very nearly," "about," "approximately," "around," "bordering on," "close to," "essentially," "in the neighborhood of," "in the vicinity of," etc., and such terms may be used interchangeably as appearing in the specification and claims. It should be appreciated that the term "proximate" is synonymous with terms such as "nearby," "close," "adjacent," "neighboring," "immediate," "adjoining," etc., and such terms may be used interchangeably as appearing in the specification and claims.

It should be appreciated that the embodiments as illustrated are only one of a variety of possible embodiments of the claimed invention. It should also be appreciated that directional adjectives, such as "upper", "lower", "right", "left", and similar variations, are to be interpreted in view of the corresponding drawings, are intended to be exemplary, and non-limiting on the scope of the appending claims.

It will be appreciated that various aspects of the disclosure above and other features and functions, or alternatives thereof, may be desirably combined into many other different systems or applications. Various presently unforeseen or unanticipated alternatives, modifications, variations, or improvements therein may be subsequently made by those skilled in the art which are also intended to be encompassed by the following claims.

Adverting now to the figures, the following description and corresponding figures depict an adjustable impact wrench and ground anchor assembly, where FIGS. **1**-**5**B depict adjustable impact wrench **200** of adjustable impact wrench and ground anchor assembly **100** and FIGS. **6**-**10** depict ground anchor **300** of adjustable impact wrench and ground anchor assembly **100**.

FIG. **1** is a perspective view of one of two possible configurations of adjustable impact wrench and ground anchor assembly **100** (hereinafter "assembly")—adjustable impact wrench **200** (hereinafter "wrench"), i.e., an adjustable impact wrench configuration of torque bar **110**. Torque bar **110** is the main component, or body, of wrench **200**. Disposed on opposite sides of torque bar **100** are first face **110***a* and second face **110***b*. Torque bar **110** terminates at first end **110***c* and second end **110***d*. Weights **112** and **114** are arranged on and fixedly secured to first face **110***a*. First weight **112** is arranged proximate first end **110***c* and second weight **114** is arranged proximate second end **110***d*. In a preferred arrangement, first weight **112** and second weight **114** are arranged to extend beyond first end **110***c* and second end **110***d*, respectively. Plurality of apertures **120** are arranged throughout the entirety of torque bar **110**. As shown in FIG. **1**, the substantially central aperture of plurality of apertures **120** has wrench shaft **130** arranged therein. Wrench shaft **130** is the fulcrum of wrench **100**. Wrench shaft **130** is defined by first end **130***a* and second end **130***b* (shown in FIGS. **2**C and **3**). Chuck **132** is arranged proximate first end **130***a* and handle **140** is arranged proximate second end **130***b*. Handle **140** is arranged to slide over wrench shaft **130**.

When assembled, torque bar **110** has wrench shaft **130** inserted into one of plurality of apertures **120**, where torque bar **110** is sandwiched by pin **170** and clamp **150**. Clamp **150** is prevented from sliding along torque bar **110** by restriction nut **160** (shown in FIGS. **2**B and **2**C) in a direction towards second end **130***b*. When wrench shaft **130** is inserted in one of plurality of apertures **120**, wrench shaft **130** is the fulcrum of torque bar **110**.

The following description should be taken in view of FIGS. **2**A through **2**C. FIG. **2**A illustrates a front view of wrench **200**, FIG. **2**B illustrates a right-side view of wrench shaft **130**, and FIG. **2**C illustrates a cross-sectional view of wrench shaft **130** taken generally along line **2**C-**2**C shown in FIG. **2**B. Clamp **150** includes wedges **156** and **158**, which extend from clamp **150**. Wedge **156** includes restriction means **156***a* and **156***b*, where restriction means **156***a* and **156***b* are angled sections of wedge **156** that are arranged to abut side **110***e* of torque bar **110** when torque bar **110** is rotated, depending on the direction of the rotation. Wedge **158** includes restriction means **158***a* and **158***b*, where restriction means **158***a* and **158***b* are angled sections of wedge **158** that are arranged to abut side **110***f* of torque bar **110** when torque bar **110** is rotated, depending on the direction of the rotation.

Wrench shaft **130** includes two integral sections, securement section **130***c* and handle portion **136**, where securement section **130***c* is arranged to be engaged within an aperture of torque bar **110** and handle portion **136** is arranged to accept handle **140** thereon. In a preferred embodiment, wrench shaft **130** includes chuck **132**, disposed proximate to first end **130***a*. Chuck **132** includes socket retention means **132***a*, which in a preferred embodiment comprising a spring-loaded socket retention ball. Chuck **132** is preferably arranged to be compatible with any standard ½ inch socket, however it should be appreciated that chuck **132** may be adapted to fit a plurality of different socket sizes, including metric sizes.

Disposed within wrench shaft **110**, preferably arranged within securement section **130***c*, is pin aperture **134**. Pin aperture **134** is arranged to accept pin **170** therein. In a preferred embodiment, pin aperture **134** is disposed within securement section **130***c* and arranged proximate to restriction nut **160**. Restriction nut **160** is preferably fixed secured on securement section **130***c* of wrench shaft **110**, proximate to handle portion **136**. Handle portion aperture **136***a* is arranged within handle portion **136**, proximate to second end **130***b*. Aperture **136***a* is preferably threaded and arranged to accept handle screw **142** therein, securing handle **140** on handle portion **136**. Handle **140** includes handle throughbore **140***c*, having two openings, first aperture **140***a* and second aperture **140***b*. It should be noted that the circumference of the head of handle screw **142** is greater than the circumference of second aperture **140***b* of handle **140**, preventing handle **140** from disengaging handle portion **136** when handle screw **142** is engaged within aperture **136***a*.

Pin **170**, or other like means, such as a removable collar or bracket, prevents torque bar **110** from sliding on wrench shaft **130** in the direction towards first end **130***a*. Inversely, when pin **170** is not engaged to wrench shaft **130**, torque bar **110** may freely slide along wrench shaft **130** to either assemble, or disassemble, wrench **200**.

FIG. **3** illustrates an exploded view of wrench **200**. Restriction nut **160** includes aperture **160***a*, whereby restriction nut **160** engages wrench shaft **130**. Aperture **160***a* of restriction nut **160** includes first and second engagement means **162** and **164**, which are planar surfaces arranged on the outside surface of restriction nut **160**. Clamp **150** includes aperture **150***a*, whereby aperture **150***a* engages wrench shaft **130**. Aperture **150***a* of clamp **150** includes first and second engagement means **152** and **154**, which are planer surfaces within the inner surface of aperture **150***a*. Restriction nut **160** is arranged to be seated within aperture **150***a* of clamp **150**, such that first and second engagement means **162** and **164** of restriction nut **160** abut first and second engagement means **152** and **154** of aperture **150***a* of

clamp **150**. This abutment configures clamp **150** to rotate concurrently with restriction nut **160** when wrench shaft **130** is rotated due to restriction nut **160** being fixedly secured to wrench shaft **130**, shown in greater detail in view of FIGS. **5**A and **5**B.

FIG. **3** illustrates a plurality of apertures in the torque bar, including apertures **122***a*, **122***b* and **122***c*, in a first set of apertures, each of which has a first diameter; and **112***a* (arranged within weight **112**), **114***a* (arranged within weight **114**), **124***a*, **124***b*, **124***c* and **124***d*, in a second set of apertures, each of which has a second diameter. It should be appreciated that the term "diameter" is intended to convey its standard meaning, i.e., a round or circular aperture, but that other shapes of these various apertures, in both the first and second sets, are contemplated and intended to be within the scope of the appended claims. Hence, the term "diameter" is intended to also include a variety of shapes, including but not limited to elliptical, oval, oblong, triangular, square, rectangular, pentagonal, hexagonal, octagonal, etc. The apertures of the first size, or first diameter, define the first set of plurality of apertures **120**. The apertures of the second size, or second diameter, define the second set of plurality of apertures **120**. Each of the plurality of apertures **120** has either the first diameter or the second diameter, where the first diameter is less than the second diameter. Plurality of apertures **120** includes: aperture **112***a* of first weight **112***b* configured as the second size of apertures; aperture **114***a* of second weight **114** configured as the second size of apertures; first aperture of first size **122***a*; second aperture of first size **122***b*; third aperture of first size **122***c*; first aperture of second size **124***a*; second aperture of second size **124***b*; third aperture of second size **124***c*; and, fourth aperture of second size **124***d*. It should be noted that aperture **112***a* and aperture **124***c* are the first end apertures, and aperture **114***a* and aperture **124***d* are the second end apertures, where aperture **112***a* and aperture **124***c* are collinearly arranged and aperture **114***a* and aperture **124***d* are collinearly arranged.

Apertures of the first size of plurality of apertures **120** (**122***a*, **122***b* and **122***c*) are arranged to accept wrench shaft **130** therein. Apertures of the second size of plurality of apertures **120** (**112***a*, **124***c*, **114***a*, **124***d*, **124***a*, and **124***b*) are arranged to accept an individual spike of plurality of spikes **320** (shown in FIGS. **6-9**). In a preferred embodiment, each of the plurality of spikes **320** has a diameter greater than the diameter of the apertures of the first size of plurality of apertures **120** but less than the diameter of the apertures of the second size of plurality of apertures **120**. It should also be appreciated that apertures of the second size of plurality of apertures **120** (**112***a*, **124***c*, **114***a*, **124***d*, **124***a*, and **124***b*) are substantially circular in shape, however alternative configurations may be contemplated, as described infra.

The following description should be taken in view of FIGS. **1** and **4**. FIG. **4** illustrates a perspective view of adjusted wrench **200'**. Adjusted wrench **200'** is defined by wrench shaft **130** being disposed within either aperture **122***b* or aperture **122***c* (as illustrated in FIG. **4**), instead of being disposed within aperture **122***a* (as shown in FIG. **1**). Wrench shaft **130**, when disposed within apertures **122***c*, creates length L**3** between the center points of aperture **122***c* and aperture **112***a*, and creates length L**4** between the center points of aperture **122***c* and aperture **114***a*. Length L**3** is greater than length L**1** and length L**2** (shown in FIG. **1**), where lengths L**1** and L**2** are substantially equal.

The moment of a force ($\vec{M}_O$), otherwise known as a moment vector, about a point (O) on an axis is defined as the cross product of the lever arm ($\vec{r}$) and the net force ($\vec{F}$) applied to the lever arm, written algebraically as:

$$\vec{M}_O = \vec{r} \times \vec{F}$$

The axis of the moment vector ($\vec{M}_O$) passes through the moment center (O) and is perpendicular to the plane containing $\vec{r}$ and $\vec{F}$. In **200**, as well as **200'**, the axis of the moment vector ($\vec{M}_O$) is the central axis of wrench shaft **130**. The moment center (O) in wrench **200** is aperture **122***a* and the moment center in adjusted wrench **200'** is aperture **122***c*. For example, the lever arm ($\vec{r}$) in wrench **200** is L**1** and the lever arm in adjusted wrench **200'** is L**3**. If a net force is applied at **112***a*, and that net force is perpendicular to both the lever arm ($\vec{r}$) and the fulcrum (the axis of the moment vector, i.e., wrench shaft **130**), then a moment will be applied to the fulcrum. The magnitude of the moment in adjusted wrench **200'** will be greater the moment applied in wrench **200** because the net force being applied is equal but the lever arm in adjusted wrench **200'** is larger.

Should wrench shaft **130** be disposed within aperture **122***b*, the magnitude of the moment applied to wrench **200** will still be larger than the moment applied to wrench **200** having wrench shaft **130** disposed in aperture **122***a* (shown in FIG. **1**), but the magnitude of the moment applied to wrench **200** having wrench shaft **130** disposed within aperture **122***b*, is less than the magnitude of the moment applied to wrench **200'**.

The following description should be taken in view of FIGS. **1**, **4**, **5**A and **5**B, where FIG. **5**A is a rear view of adjusted wrench **200'** shown in FIG. **4** and FIG. **5**B is a rear view of wrench **200** shown in FIG. **1**. FIG. **5**A and FIG. **5**B both illustrate wrenches **200** and **200'** rotated into a tightening position, **201** and **201'**. **110'**, **110***e'*, and **1101'** all represent **110**, **110***e*, and **110***f*, when torque bar **110** of wrench **200** and adjusted wrench **200'** is in a tighten positioned (where a tightened torque bar is indicated by **110'**).

To tighten a lug nut, or other like nuts, attachment means **132***a* of chuck **132** (shown in FIG. **4**) is engaged to a socket to engage a lug nut, where wrenches **200** and **200'** need to be rotated in the clockwise direction about a central axis of wrench shaft **130**, i.e., the fulcrum of torque bars **110**. Torque bars **110** of wrenches **200** and **200'** will freely rotate about the central axis of wrench shaft **130**, specifically between restriction means **156***b* of wedges **156** and restriction means **158***b* of wedges **158** until second outer edges **110***f* (shown in broken lines as **1101**) of wrenches **200** and **200'** abuts restriction means **158***b* of wedges **158** while first outer edge **110***e* (shown in broken lines as **110***e'*) concurrently abuts restriction means **156***a* of wedges **156**. As clockwise rotation is continuously imparted to torque bar **110** while second outer edges **110***f* (shown in broken as **1101**) abut restriction means **158***b*, and first outer edges **110***e* abut restriction means **156***a* (shown in broken lines as **110***e'*), torque bar **110** (shown in broken lines as **110'**) will rotate wrench shafts **130**, i.e., wrenches **201** and **201'**.

The following description of FIGS. **6-10** depict ground anchor **300** (hereinafter "anchor") of adjustable impact wrench and ground anchor assembly **100**.

The following description should be taken in view of FIGS. **6** through **7**B. FIG. **6** illustrates a perspective view of anchor **300** of adjustable impact wrench and ground anchor assembly **100**, i.e., a ground anchor configuration of torque bar **110**. FIG. **7**A illustrates a right-side view of anchor **300** and FIG. **7**B illustrates a top plan view of anchor **300**. Anchor **300** generally comprises, torque bar **110**, plurality of

spikes **320**, and clip **310**. Plurality of spikes **320** are shown within apertures **124***b*, **124***a*, and **114***a*, where apertures **124***b*, **124***a*, and **114***a* are of a second size, i.e., second diameter. Clip **310** is secured through a screw (shown and described in greater detail, infra) disposed within aperture **112***a* of weight **112** (shown in FIG. **8**). It should be noted that the spike of plurality of spikes **120** disposed within aperture **114***a* may alternatively be disposed within aperture **112***a* of weight **112** and clip **310** may be secured via its screw to aperture **114***a*.

FIG. **8** is a cross-sectional view of anchor **300** taken generally along line **8-8** on FIG. **7**B. As shown, spikes **322**, **324**, and **326** of plurality of spikes **320** are disposed within apertures **124***a*, **124***b*, and **124***d*, respectively, specifically, spike **326** is disposed within apertures **124***d* and **114***a*. Spike **322** terminates at its respective ends, tip end **322***a* and cap end **322***b*. Spike **324** terminates at its respective ends, tip end **324***a* and cap end **324***b*. Spike **326** terminates at its respective ends, tip end **326***a* and cap end **326***b*. The area between the respective end caps and tips of each of plurality of spikes **320** is preferable cylindrical and also has a diameter than is greater than the apertures of the first size (apertures **122***a*, **122***b*, and **122***c*) of plurality of apertures **120** but the diameter of each of plurality of spikes **320** is less than the diameter of the apertures of the second size (apertures **124***a*, **124***b*, **114***a*, and **124***d*) of plurality of apertures **120**. Tips, **322***a*, **324***a*, and **326***a* of spikes **322**, **324**, and **326**, are arranged to penetrate the ground under second surface **110***b* of torque bar **110**. Caps **322***b*, **324***b*, and **324***c* of spikes **322**, **324**, and **326**, are arranged to prevent torque bar **110** from disengaging each of the spikes from their respective apertures when force is imparted on clip **310**, i.e., caps **322***b*, **324***b*, and **324***c* of spikes **322**, **324**, and **326** have an external circumference that is greater than the inner circumference of apertures **124***a*, **124***b*, **124***d*, and **114***a*. Clip **310** includes two apertures (shown in FIG. **9**) which engage clip bolt **330**. Clip bolt **330** is arranged to be seated with apertures **112***a* and **124***c* when engaged within the apertures of clip **310** and is secured within apertures **112***a* and **124***c* via clip nut **330**.

FIG. **9** is an exploded perspective view of anchor **300**. Clip **310** comprises attachment section **312** which terminates into first end **314** and second end **316**. Disposed within first end **314** is aperture **314***a* and disposed within second end **316** is aperture **316***a*. To engage clip **310** to torque bar **110**, apertures **314***a* and **316***a* are aligned with apertures **112***a* and **124***c* (shown in FIG. **8**), where bolt **330** is inserted through apertures **316***a*, **124***c*, **112***a*, and **314***a*, exposing a threaded section of bolt **330** through aperture **314***a* where nut **332** is arranged to threadably secure to the exposed threaded section of bolt **330**.

FIG. **10** is a right-side view of anchor **300** in use, specifically illustrating plurality of spikes **320** inserted into ground **500** that torque bar **110** is resting above. To use anchor **300**, clip **300** is first attached to torque bar **110**, as described supra. Then, each respective stake (**322**, **324**, and **326**) are placed in their respective apertures (**124***b*; **124***a*; and, **114***a* and **124***d*). After, each stake (**322**, **324**, and **326**) will have a force imparted on their respective caps (**322***b*, **324***b*, and **326***b*), such as a hammer impact. The force imparted on each stake (**322**, **324**, and **326**) drives the stakes tips (**322***a*, **324***a*, and **326***a*) through the respective apertures (**124***b*; **124***a*; and, **114***a* and **124***d*) and into ground **500**—securing anchor **300** thereto. Lastly, attachment clip **400** (illustrated as a known-in-the carabiner clip), or other suitable attachment means, such as a rope, chain, etc., is connected to attachment loop **312***a*, formed by attachment section **312** of clip **310**, where attachment clip **400** is connected to attachment chain **401** (or other means, such as a rope, strap, etc.). Attachment chain **401** could be connected to a powered winch, a vehicle, or a person. One with ordinary skill in the art would appreciate that a mounted anchor **300**, as shown, could be used in a plurality of situations where an object or person, needs to be connected to a fixed point, i.e., a mounted anchor **300**.

In a preferred embodiment, all of the aforementioned components are made of a tempered steel, and it should be appreciated that alternative metal alloys, stainless steel, or an extremely durable plastic, carbon fiber, or polymer could be used for all, or some of the components—in various combinations of the exemplary materials provided above.

In a preferred embodiment, the apertures of a second diameter disposed within the torque bar, as described supra, are of a larger diameter than each spike of the plurality of spikes—allowing the spikes to be inserted into the torque bar and the ground there below, at an angle, thereby increasing the integrity of the ground connection of a "staked" ground anchor (shown in FIG. **10**) when force is imparted onto the torque bar.

It should also be appreciated that although the plurality of apertures disposed within the torque are preferable two different sizes, in alternative embodiments, the plurality of apertures may be the same size. It should be further appreciated that in a preferred embodiment the plurality of apertures are substantially circular, however, alternative shaped-apertures could be utilized, e.g., square, rectangular, oblong, elliptical, etc.

Although the weights are affixed to the torque bar in a preferred embodiment, it is contemplated that in alternative embodiments, the weights could be detachable in order to facilitate a further disassembly of the present invention. The weights also have a secondary purpose of providing handles for a user rotating the adjustable wrench to tighten or loosen a nut (similar to FIGS. **5**A and **5**B).

The plurality of spikes are preferably linear, or straight, however, in alterative embodiments, the plurality of spikes could have a contoured, or curved configuration. Additionally, in a preferred embodiment, the plurality of spikes have a substantially circular body, or cylindrical, however, alternative shapes may be used, such as square or rectangular shapes, triangular, octagonal, oblong, elliptical, hexagonal, pentagonal, etc.

Although the aforementioned description illustrates a chuck disposed at the first end of the wrench shaft of the adjustable impact wrench, it should be appreciated in alternative embodiments that a socket could be directly fixed, or integral, with the first end of the wrench shaft, thereby removing the need for the chuck and its respective attachment means. Similarly, the handle, disposed on the wrench shaft proximate to the second end of the wrench shaft, could be integral with the wrench shaft and thereby removing the need for the screw aperture disposed within the second end of the wrench shaft. Also similar, the clamp could be fixedly secured on the wrench shaft, thereby removing the need for the restriction nut secured on the wrench shaft in the preferred embodiment.

In further alternative embodiments, the wrench shaft could include a known-in-the-art rachet system, like a socket wrench. The wrench shaft would include a ratcheting mechanism allowing a nut engaged to the chuck to be tightened or loosened with a reciprocating motion, thereby eliminating the need to potentially remove and refit the wrench after each turn in limited-space situations. Such ratcheting mechanism within the wrench shaft would also

include a lever on the wrench shaft that is arranged to switch the wrench shaft between a tightening and a loosening configuration.

Thus, it is seen that the objects of the present invention are efficiently obtained, although modifications and changes to the invention should be readily apparent to those having ordinary skill in the art, which modifications are intended to be within the spirit and scope of the invention as claimed. It also is understood that the foregoing description is illustrative of the present invention and should not be considered as limiting. Therefore, other embodiments of the present invention are possible without departing from the spirit and scope of the present invention.

REFERENCES NUMERALS

100 Adjustable impact wrench and ground anchor assembly
110 Torque bar of **100**
110' Torque bar of **201** and **201'**
110*a* First face of torque bar **110**
110*b* Second face of torque bar **110**
110*c* First end of torque bar **110**
110*d* Second end of torque bar **110**
110*e* First outer edge of torque bar **100**
110*e'* First outer edge of torque bar **110'**
110*f* Second outer edge of torque bar **110**
110*f'* Second outer edge of torque bar **110'**
112 First weight
112*a* Aperture of first weight **112**
114 Second weight
114*a* Aperture of second weight **114**
120 Plurality of apertures of torque bar **100**
122*a* First aperture of first size of plurality of apertures **120**
122*b* Second aperture of first size of plurality of apertures **120**
122*c* Third aperture of first size of plurality of apertures **120**
124*a* First aperture of second size of plurality of apertures **120**
124*b* Second aperture of second size of plurality of apertures **120**
124*c* First end aperture of second size of plurality of apertures **120**
124*d* Second end aperture of second size of plurality of apertures **120**
130 Wrench shaft
130*a* First end of wrench shaft **130**
130*b* Second end of wrench shaft **130**
132 Chuck of wrench shaft **130**
132*a* Attachment means of chuck **132**
134 Pin aperture of wrench shaft **130**
136 Handle portion of wrench shaft **130**
136*a* Aperture of handle portion **136**
140 Handle of wrench shaft **130**
140*a* First aperture of handle **140**
140*b* Second aperture of handle **140**
140*c* Handle through-bore
142 Handle screw
150 Clamp
150*a* Clamp aperture
152 First engagement means of aperture **150***a*
154 Second engagement means of aperture **150***a*
156 First wedge of clamp **150**
156*a* First restriction edge of first wedge **156**
156*b* Second restriction edge of first wedge **156**
158 Second wedge of clamp **150**
158*a* First restriction edge of second wedge **158**
158*b* Second restriction edge of second wedge **158**
160 Restriction nut
160*a* Aperture of restriction nut
170 Pin
200 Adjustable impact wrench
201 Tightened wrench **200**
200' Adjusted adjustable impact wrench
201' Tight adjusted wrench **200'**
300 Ground anchor
310 Clip
312 Attachment section of clip **310**
312*a* Attachment loop of attachment section **312**
314 First end of clip **310**
314*a* Aperture of first end **314**
316 Second end of clip **310**
316*a* Aperture of second end **316**
320 Plurality of spikes
322 First spike
322*a* Tip of first spike **322**
322*b* Cap of first spike **322**
324 Second spike
324*a* Tip of second spike **324**
324*b* Cap of second spike **324**
326 Third spike
326*a* Tip of third spike **326**
326*b* Cap of third spike **326**
330 Clip bolt
332 Clip nut
400 External attachment clip
401 External attachment chain
500 Ground
L**1** First length
L**2** Second length
L**3** Third length
L**4** Fourth length

What is claimed is:

1. An adjustable impact wrench and ground anchor assembly, comprising:

a torque bar having a first end and a second end, said torque bar having a first set of a plurality of apertures disposed therein and a second set of a plurality of apertures disposed therein, each aperture in said first set having a first diameter and each aperture in said second set having a second diameter, where said first diameter is less than said second diameter;

a wrench shaft, said wrench shaft having a first end and a second end, said wrench shaft having a chuck arranged at said first end, said wrench shaft having a removable handle arranged at said second end, said wrench shaft arranged to be seated within one of said first diameter apertures of said plurality of apertures;

a clamp, said clamp arranged to accept said wrench shaft through an aperture disposed therein;

a pin, said pin arranged to engage a pin aperture of said wrench shaft and further arranged to sandwich said bar between said pin and said clamp;

a plurality of spikes, each one of which spikes is arranged to engage at least one of an aperture of said second set of apertures, where each one of said plurality of spikes has a third diameter which is greater than said first diameter; and,

a clip, said clip arranged to engage one of a pair of end apertures of said plurality of apertures.

2. The adjustable impact wrench and ground anchor assembly recited in claim **1**, wherein said clamp comprises

a first end and a second end, said clamp further comprising an aperture, extending from said first end and said second end of said clamp are a pair of restriction members, said restriction members are arranged to abut an external surface of said torque bar when said clamp is engaged to said wrench shaft via said aperture.

3. The adjustable impact wrench and ground anchor assembly recited in claim **2**, wherein a lock nut is fixedly secured on said wrench shaft, said lock nut arranged to be seated with an aperture of said clamp thereby restricting rotational movement of said clamp about said wrench shaft.

4. The adjustable impact wrench and ground anchor assembly recited in claim **1**, wherein said chuck of said wrench shaft is arranged to accept a socket thereon.

5. The adjustable impact wrench and ground anchor assembly recited in claim **1**, wherein said plurality of spikes each comprise a first end and a second end, said first end of each of said plurality of spikes having a tip, said second end of each of said plurality of spikes having an end cap, wherein said end cap of each of said plurality of spike has a circumference greater than the circumference of each of said second diameter apertures of said plurality of apertures.

6. The adjustable impact wrench and ground anchor assembly recited in claim **1**, wherein said pair of end apertures of said torque bar are disposed proximate to said first end and said second end of said torque bar, wherein said pair of end apertures are said second diameter apertures of said plurality of apertures.

7. The adjustable impact wrench and ground anchor assembly recited in claim **6**, wherein said torque bar comprises a pair of weights disposed proximate to said first end and said second end of said torque bar, wherein said pair of weights each comprise a weight aperture, said weight apertures further arranged to align with said pair of end apertures.

8. The adjustable impact wrench and ground anchor assembly recited in claim **1**, wherein said adjustable impact wrench has an adjustable moment, said adjustable moment is determined by which aperture of said first set of said plurality of apertures said wrench shaft is disposed within.

9. The adjustable impact wrench and ground anchor assembly recited in claim **1** wherein each of said first set of a plurality of apertures is round.

10. The adjustable impact wrench and ground anchor assembly recited in claim **1** wherein each of said second set of a plurality of apertures is round.

11. An adjustable impact wrench and ground anchor assembly, comprising:

a torque bar having a first, a second end, and a plurality of apertures comprising a first set and a second set disposed therein, where the first set of apertures have a first diameter and the second set of apertures have a second diameter, where said first diameter is less than said second diameter;

said torque bar having an adjustable impact wrench configuration whereby said torque bar is arranged to accept a wrench shaft within one of said first set of said plurality of apertures, said wrench shaft secured within one of said plurality of apertures of the first diameter via a clamp arranged on said wrench shaft and a pin arranged to engage said wrench shaft; and,

said torque bar having a ground anchor configuration whereby said torque bar is arranged to accept at least one spike of a plurality of spikes within at one of said second set of said plurality of apertures, each of said plurality of spikes have a diameter greater than said first diameter and less than said second diameter, said torque bar further arranged to accept a clip within one of a pair of end apertures of said second set of said plurality of apertures, said pair of end apertures arranged proximate to the respective first and second ends of said torque bar.

12. The adjustable impact wrench and ground anchor assembly recited in claim **11**, wherein said clamp comprises a first end and a second end, said clamp further comprising an aperture, extending from said first end and said second end of said clamp are a pair of restriction members, said restriction members are arranged to abut an external surface of said torque bar when said clamp is engaged to said wrench shaft via said aperture.

13. The adjustable impact wrench and ground anchor assembly recited in claim **12**, wherein a lock nut is fixedly secured on said wrench shaft, said lock nut arranged to be seated with an aperture of said clamp thereby restricting rotational movement of said clamp about said wrench shaft.

14. The adjustable impact wrench and ground anchor assembly recited in claim **11**, wherein said wrench shaft includes a first and second ends, said wrench shaft having a chuck arranged on said first end wherein said chuck is arranged to accept a socket thereon.

15. The adjustable impact wrench and ground anchor assembly recited in claim **11**, wherein said plurality of spikes each comprise a first end and a second end, said first end of each of said plurality of spikes having a tip, said second end of each of said plurality of spikes having an end cap, wherein said end cap of each of said plurality of spike has a diameter greater than the diameter of each of said second set of said plurality of apertures.

16. The adjustable impact wrench and ground anchor assembly recited in claim **11**, wherein said torque bar comprises a pair of weights disposed proximate to said first end and said second end of said torque bar, wherein said pair of weights each comprise a weight aperture, said weight apertures further arranged to align with said pair of end apertures.

17. The adjustable impact wrench and ground anchor assembly recited in claim **11**, wherein said adjustable impact wrench configuration has an adjustable moment, said adjustable moment is determined by which aperture of said first set of said plurality of apertures said wrench shaft is disposed within.

18. An adjustable impact wrench and ground anchor assembly, comprising:

a wrench shaft;

a plurality of spikes; and,

a torque bar having a plurality of apertures, wherein at least two of said plurality of apertures are of different sizes, wherein said wrench shaft is arranged to engage with at least one of said plurality of apertures of said torque bar, wherein each of said plurality of spikes may pass through and engage at least one of said at least two of said plurality of apertures but not pass through and engage at least one other of said at least two of said plurality of apertures.

19. The adjustable impact wrench and ground anchor assembly recited in claim **18**, wherein said adjustable impact wrench configuration has an adjustable moment, said adjustable moment is determined by which aperture of said plurality of apertures said wrench shaft is disposed within.

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