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Park

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(54) **QUICK-RELEASE GRIPPING INSERT ASSEMBLY**

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E21B 19/22 (2006.01)
B66D 3/00 (2006.01)

(52) **U.S. Cl.**
CPC ***E21B 19/22*** (2013.01); ***B66D 3/003*** (2013.01)

(58) **Field of Classification Search**
CPC E21B 19/22
USPC 166/77.3; 226/173
See application file for complete search history.

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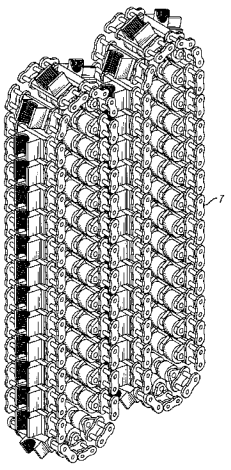
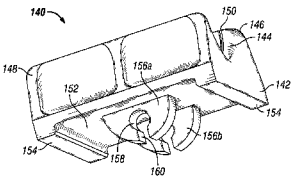
(57) **ABSTRACT**

A coiled tubing injector unit insert assembly includes a gripping insert configured to be coupled to a carrier block, the insert comprising a tongue with a first cutout configured to engage a shaft extending within a carrier block pocket, the shaft having a first diameter portion and a second larger diameter portion and a junction between the two shaft diameters that is located within the carrier block pocket to couple the gripping insert to the carrier block.

18 Claims, 10 Drawing Sheets





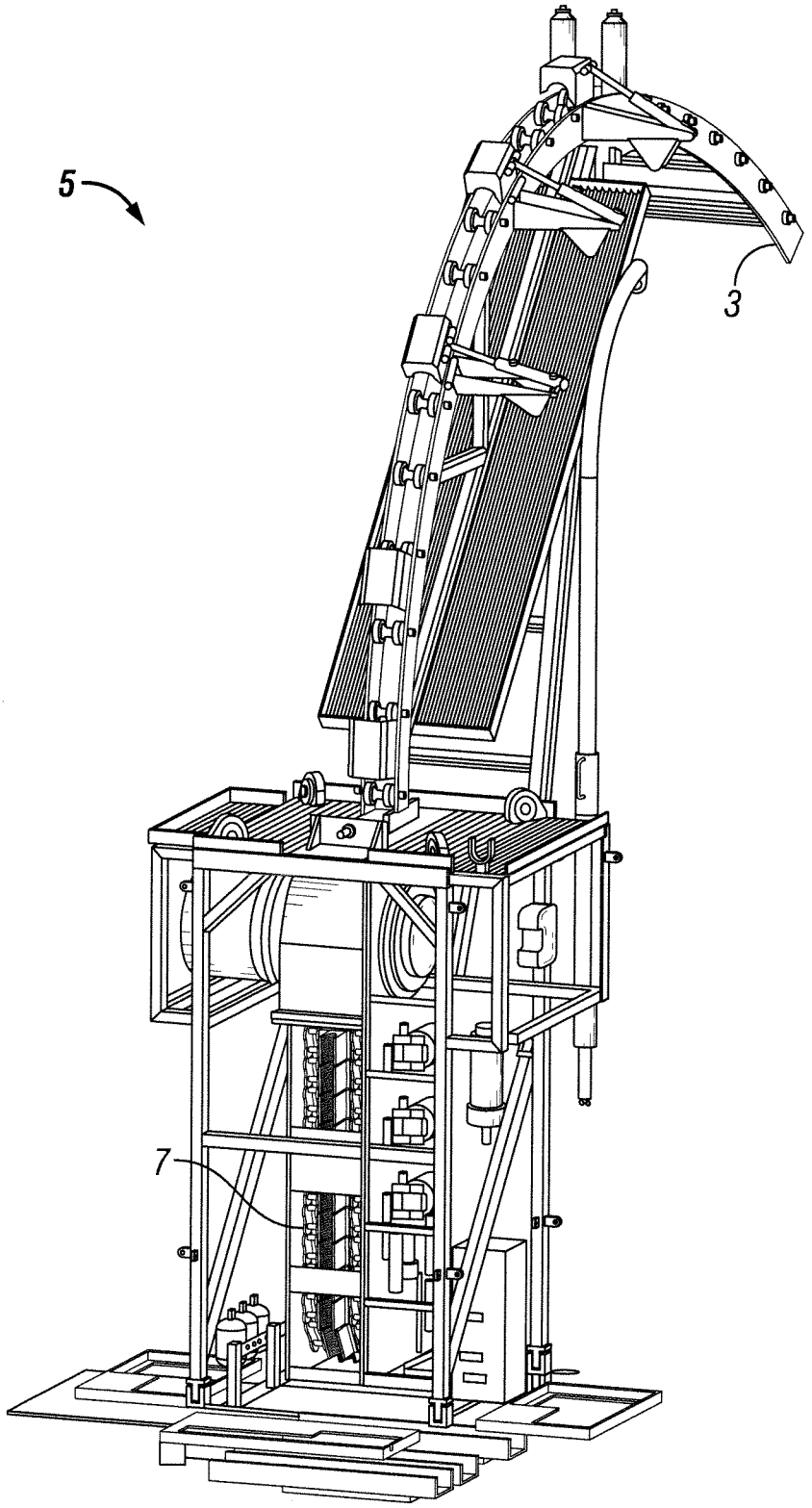


FIG. 1

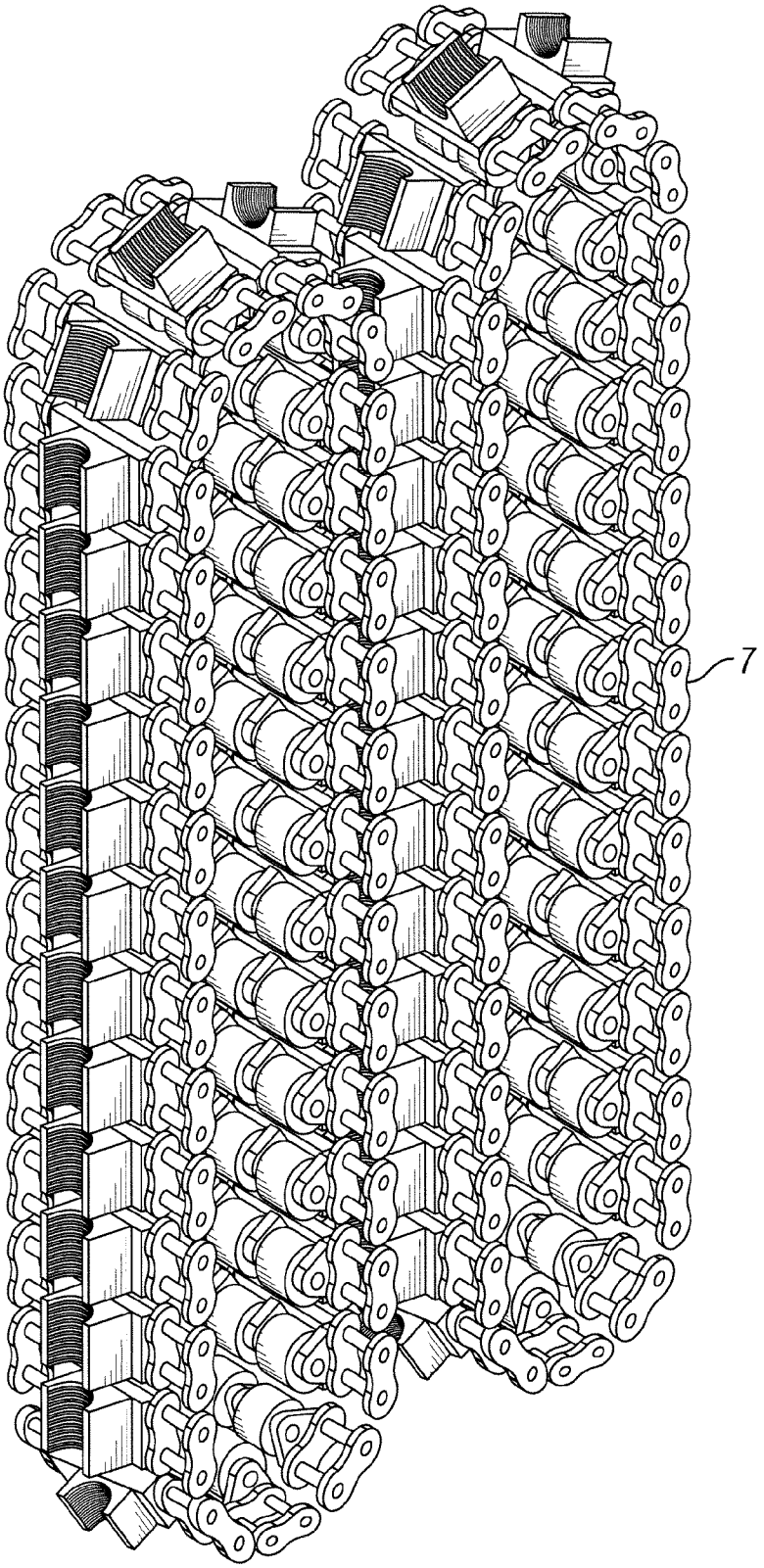


FIG. 2

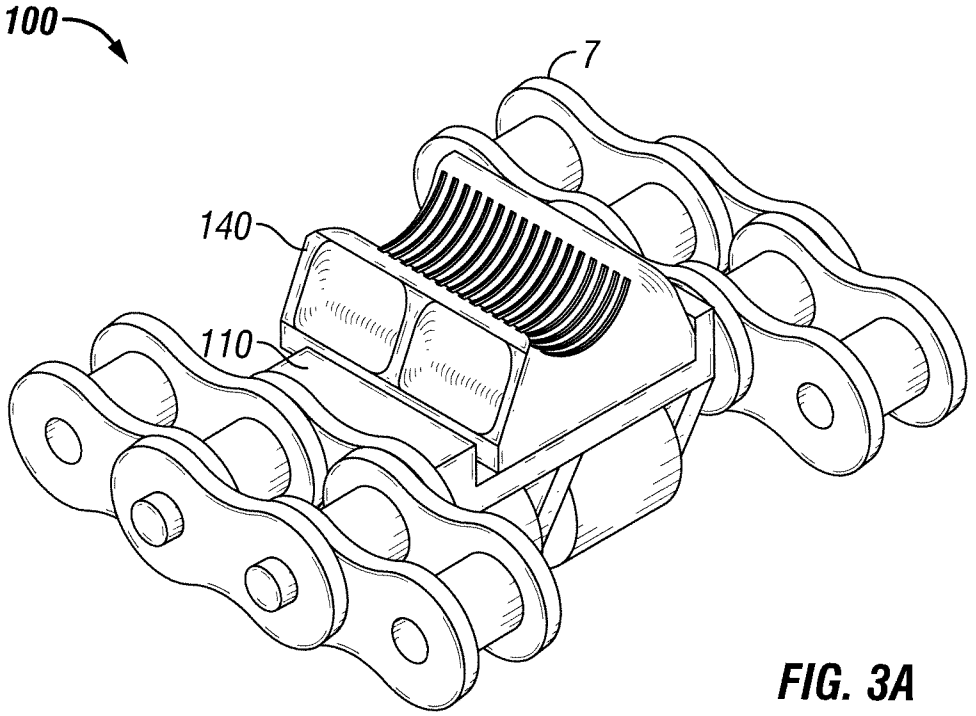


FIG. 3A

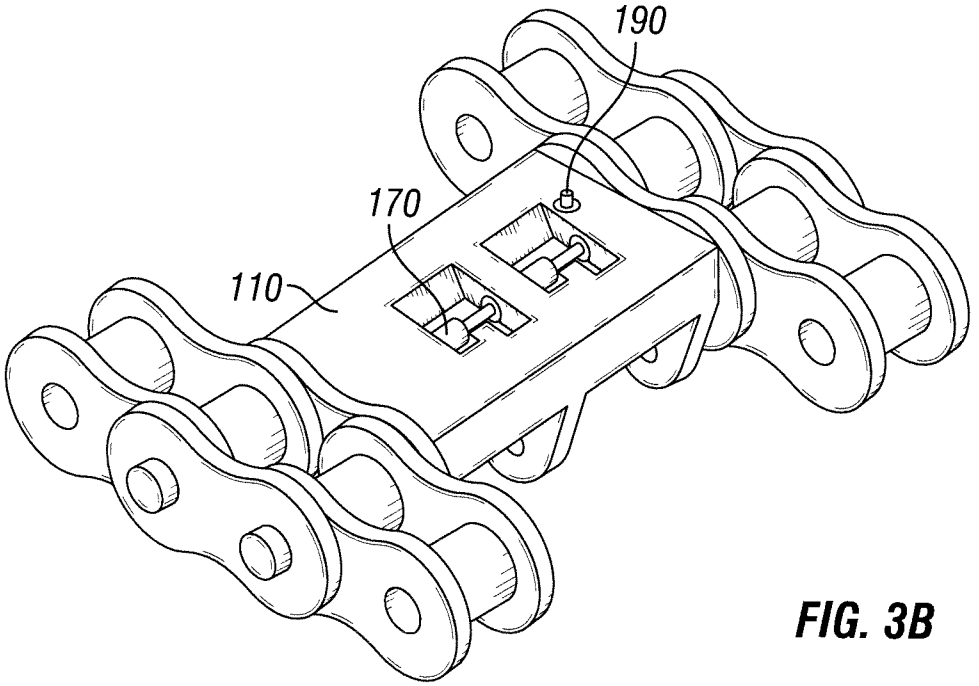


FIG. 3B

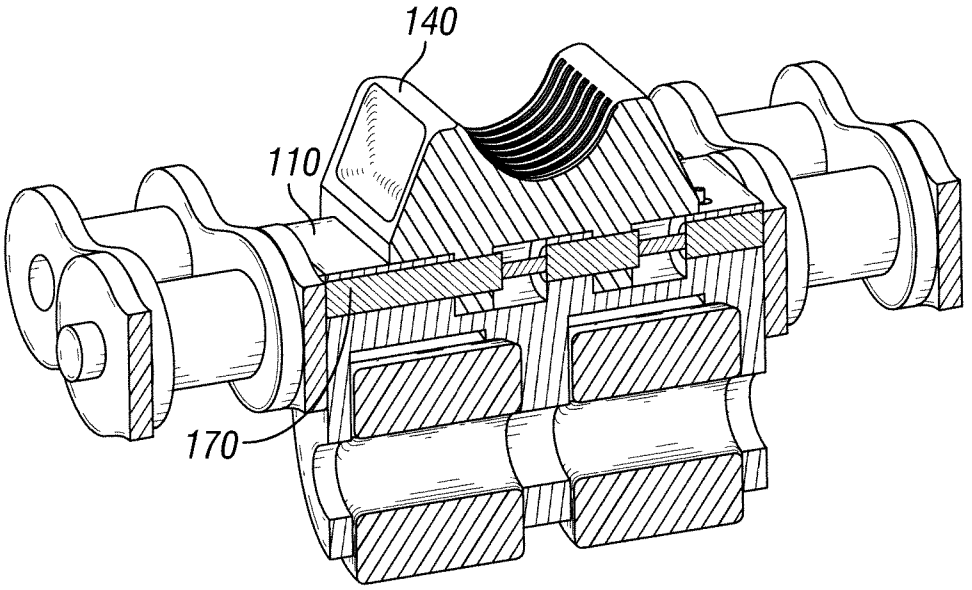


FIG. 3C

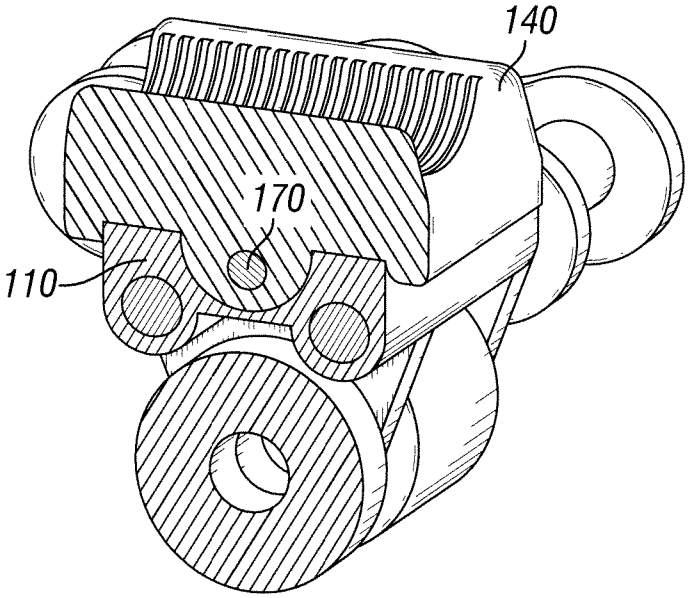


FIG. 3D

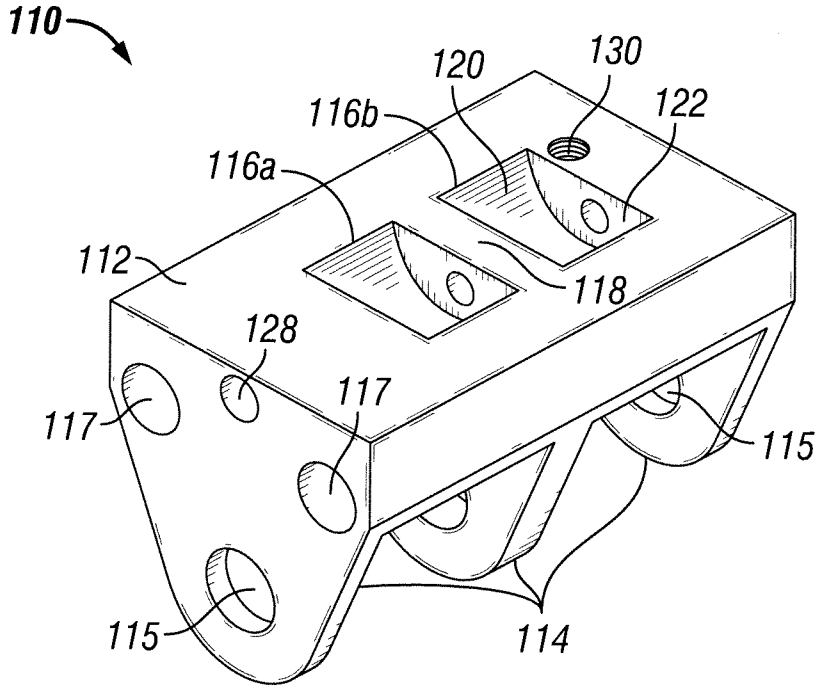

110
120
130
116b
122
116a
112
118
128
117
117
115
115
114

FIG. 4A

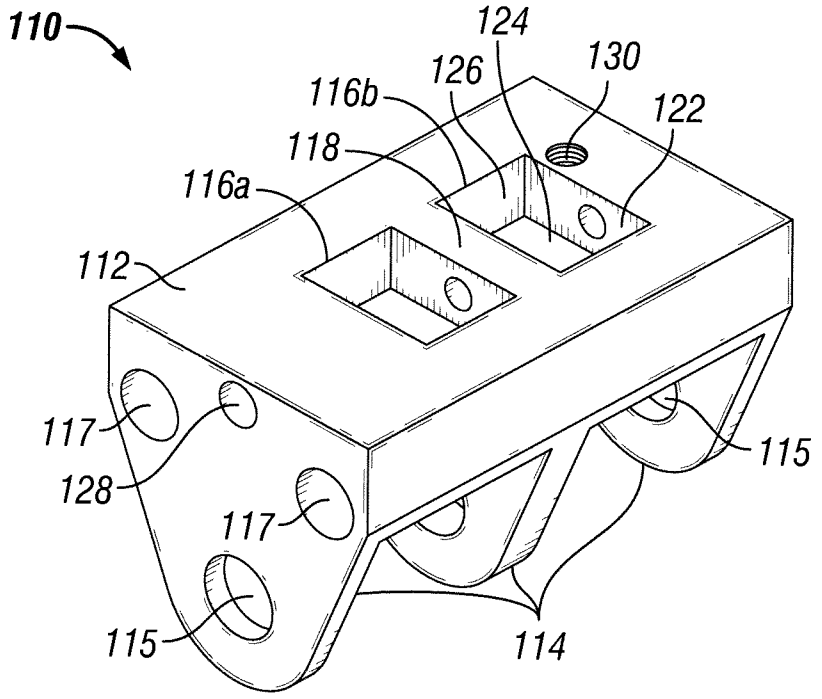

110
124
126
130
116b
122
118
116a
112
117
128
117
115
115
114

FIG. 4B

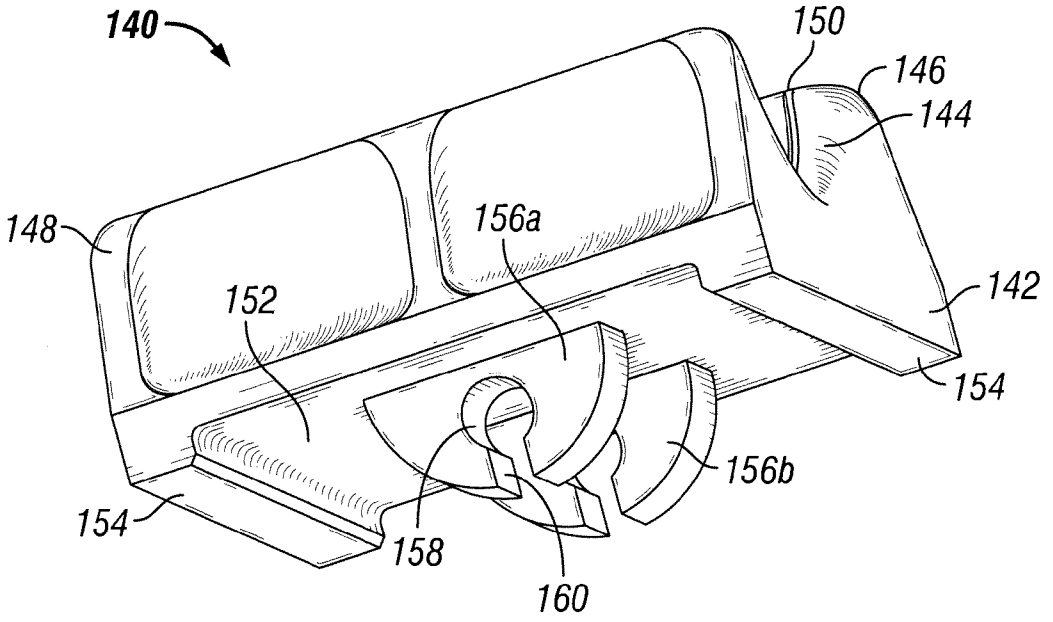

140
150
146
144
148
156a
142
152
154
156b
154
158
160

FIG. 5A

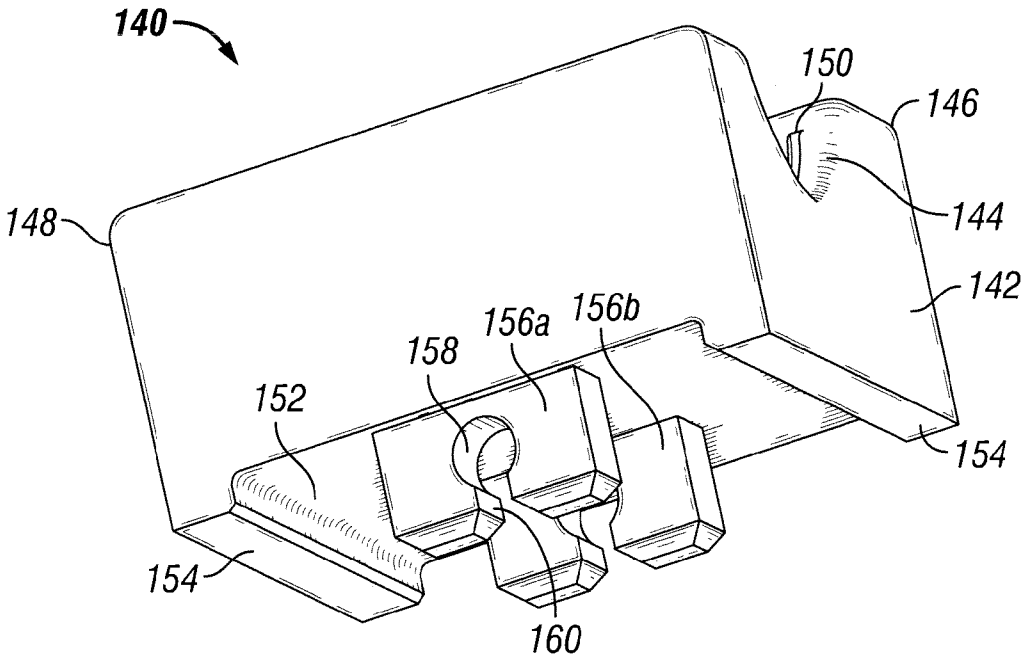

140
150
146
148
144
142
156a
156b
158
152
154
154
160

FIG. 5B

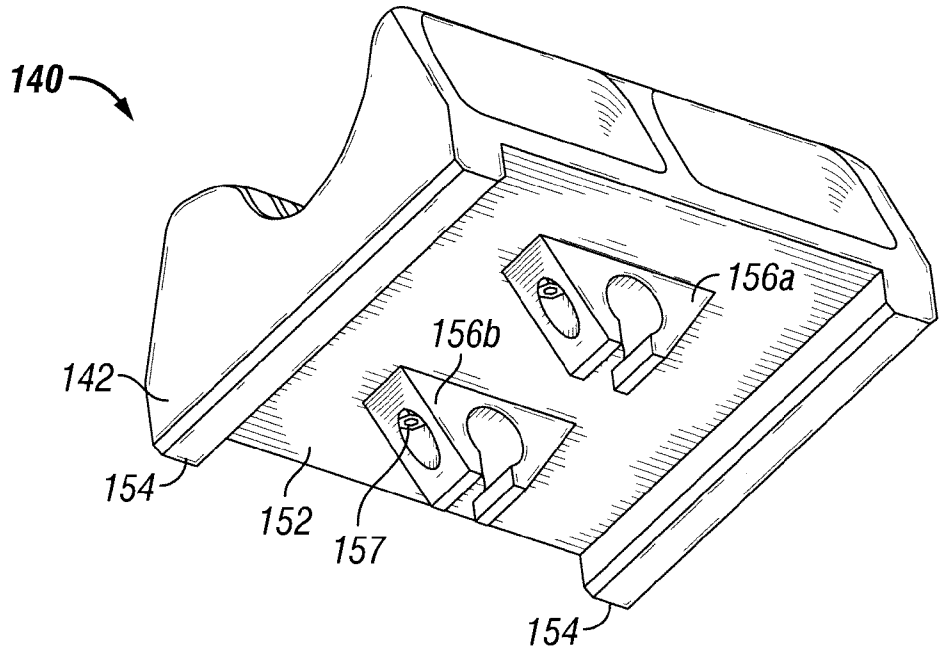


FIG. 5C

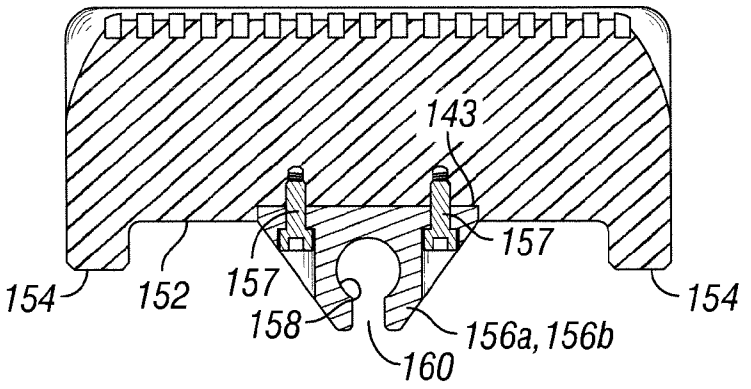


FIG. 5D

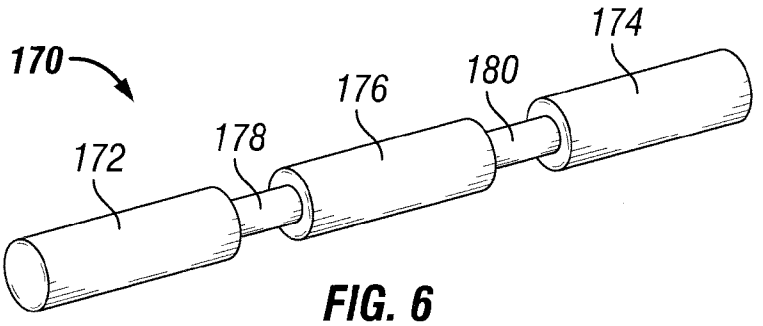


FIG. 6

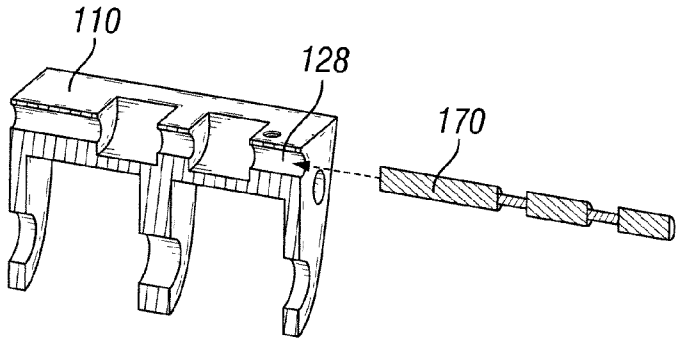


FIG. 7A

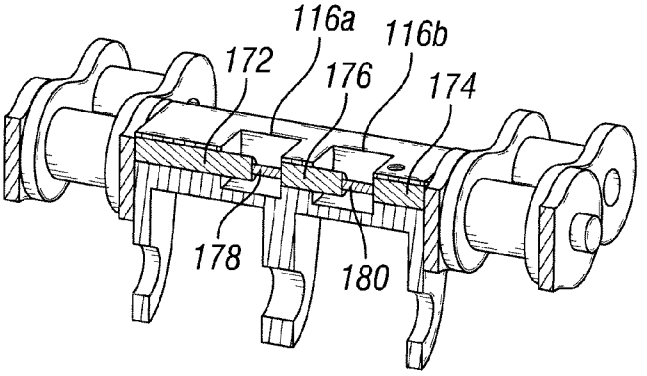


FIG. 7B

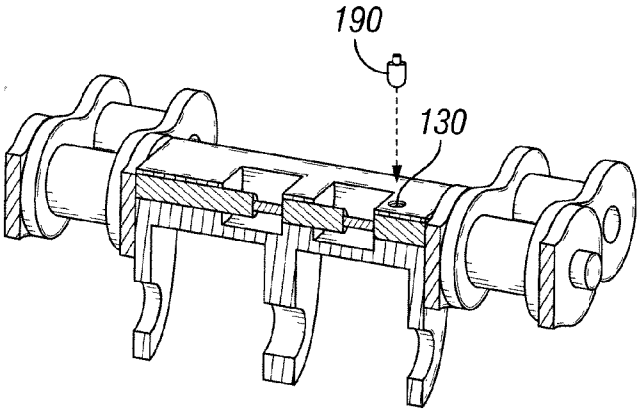


FIG. 7C

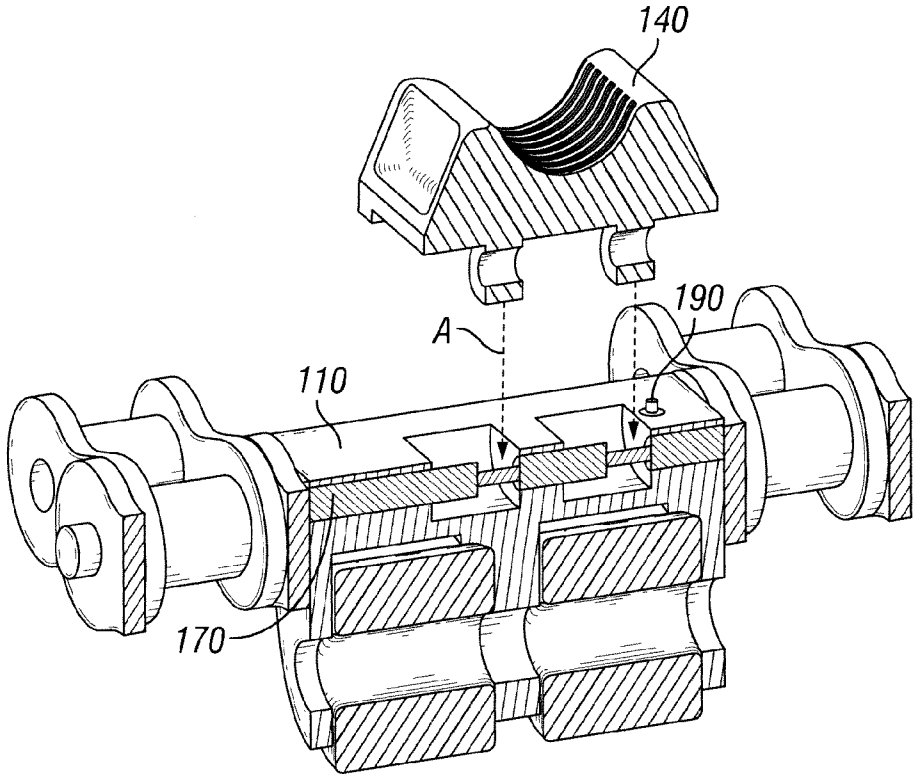


FIG. 8A

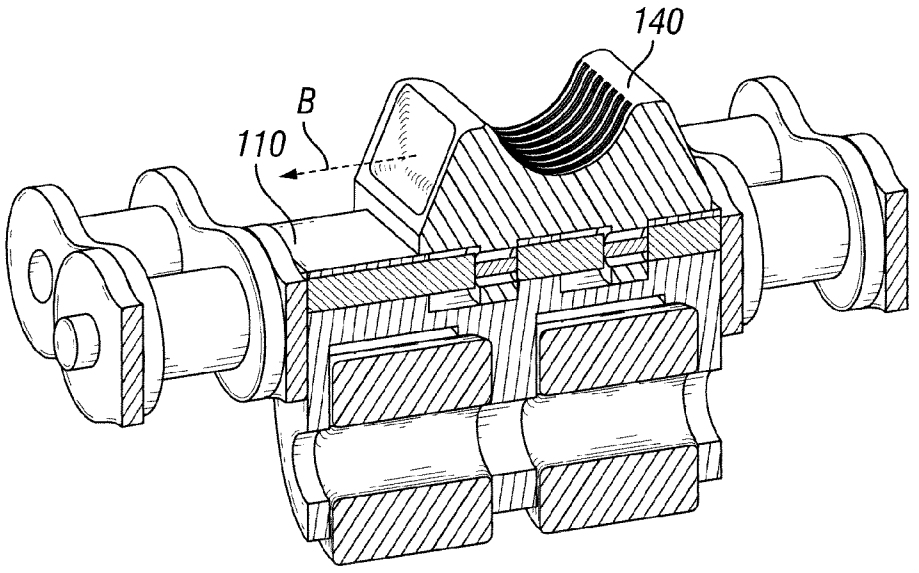


FIG. 8B

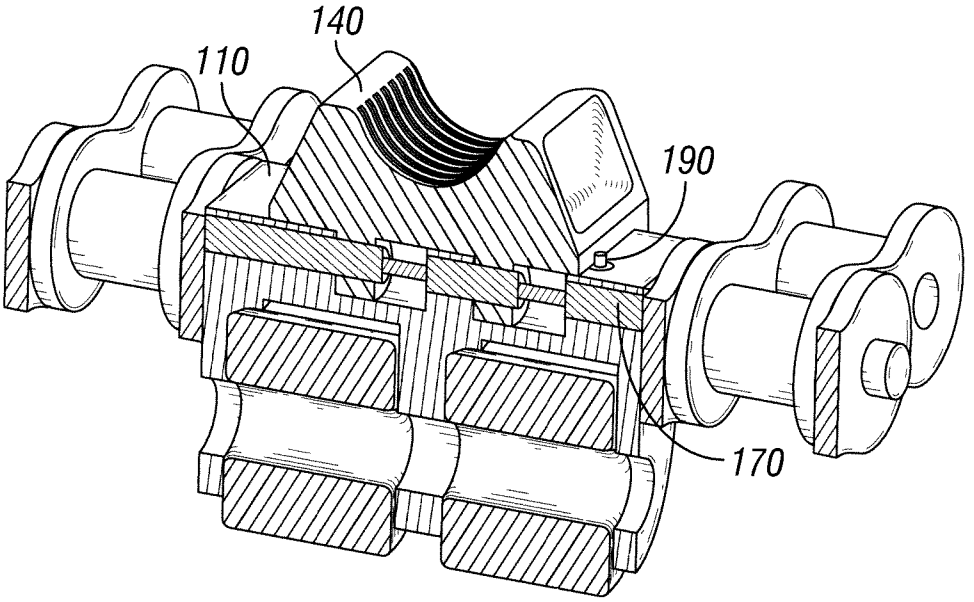


FIG. 8C

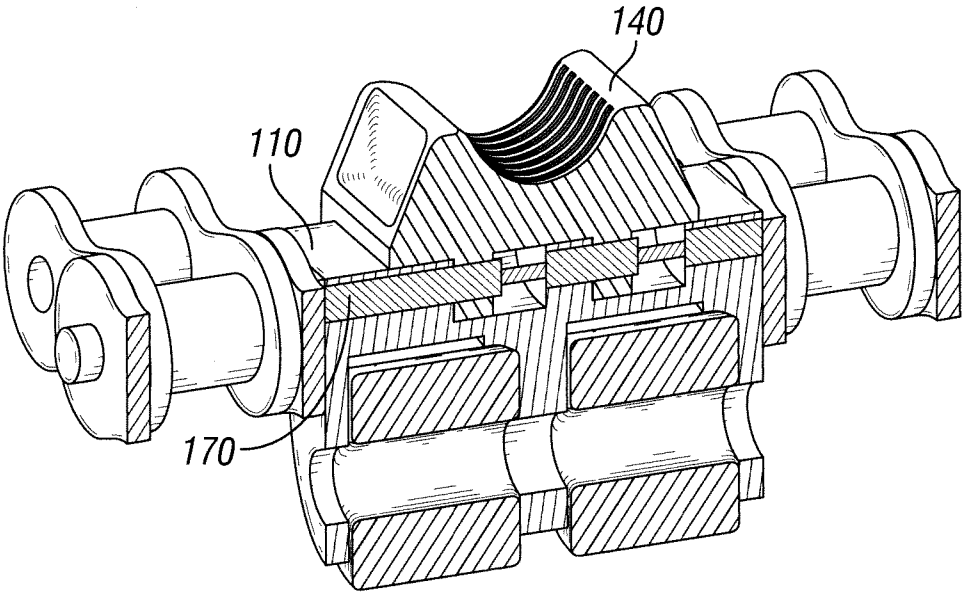


FIG. 8D

QUICK-RELEASE GRIPPING INSERT ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority under 35 U.S.C. §119(e) to U.S. Provisional Application No. 61/820,440 filed May 7, 2013, which is incorporated herein by reference in its entirety.

FIELD

This invention relates to coiled tubing injector units. More particularly, this invention relates to gripping insert assemblies for coiled tubing injector units.

BACKGROUND AND SUMMARY

In the oil and gas industries, coiled tubing refers to metal piping used for interventions in oil and gas wells and sometimes as production tubing in depleted gas wells. Available in sizes ranging from 1 inch to 4.5 inches, coiled tubing strings are carried on reels and injected into a wellbore using a coiled tubing injector unit. A typical coiled tubing injector unit **5** is illustrated in FIG. **1**. The typical unit includes a goose-neck support **3**, a rotary transmission assembly, parallel drive chains **7** carrying gripping insert assemblies, skates and a hydraulic system. (The transmission assembly, gripping insert assemblies, skates and hydraulic system are not shown in detail in FIG. **1**). Those skilled in the art are familiar with the components and operation of the unit **5** illustrated in FIG. **1**.

The series of gripping insert assemblies carried by the chains provide the sole direct support for holding the coiled tubing in place or moving the tubing. The gripping insert assemblies are arranged in opposing pairs to secure the coiled tubing string between the injector-head chains. The hydraulic system applies pressure to the skates which in turn force the gripping insert assemblies toward each other thereby securing the coiled tubing between the gripping insert assemblies. Additionally, the hydraulic drive system drives the chains to feed the coiled tubing string into the well or pull the tubing out of the well.

A typical gripping insert assembly includes a carrier block secured to the drive chain and a gripping insert supported by the carrier block. From time to time, the gripping insert must be replaced due to damage or wear or to accommodate a change in tubing diameter or insertion of a downhole tool. Thus, a need exists for a gripping insert assembly which permits quick replacement of the gripping insert.

In one aspect, embodiments disclosed herein relate to a coiled tubing injector unit insert assembly including a gripping insert configured to be coupled to a carrier block, the insert comprising a tongue with a first cutout configured to engage a shaft extending within a carrier block pocket, the shaft having a first diameter portion and a second larger diameter portion and a junction between the two shaft diameters that is located within the carrier block pocket to couple the gripping insert to the carrier block.

In other aspects, embodiments disclosed herein relate to a coiled tubing conveying apparatus including a pair of continuous parallel drive chains revolving in a common plane, said pair of continuous drive chains having opposed, elongated parallel runs spaced apart to form a path for engaging tubing passing there through, and a plurality of gripping insert assemblies carried on each of said pair of continuous drive chains, each comprising a gripping insert configured to be coupled to a carrier block, the insert comprising a tongue with a first cutout configured to engage a shaft extending within a carrier block pocket, the shaft having a first diameter portion and a second larger diameter portion and a junction between the two shaft diameters that is located within the carrier block pocket to couple the gripping insert to the carrier block.

In yet other aspects, embodiments disclosed herein relate to a method of assembling a coiled tubing injector unit insert assembly including providing a gripping insert configured to be coupled to a carrier block, the insert comprising a tongue with a first cutout configured to engage a shaft extending within a carrier block pocket, the shaft having a first diameter portion and a second larger diameter portion and a junction between the two shaft diameters that is located within the carrier block pocket to couple the gripping insert to the carrier block, inserting the gripping insert tongue into the carrier block pocket until the first cutout is substantially concentrically aligned with the larger shaft diameter portion, and sliding the gripping insert in a first direction and causing the first cutout in the tongue to engage the larger shaft diameter portion, thereby coupling the gripping insert to the carrier block.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated in the accompanying drawings wherein,

FIG. **1** is a perspective view of a coiled tubing injector unit;

FIG. **2** illustrates a drive chain assembly component of FIG. **1**;

FIGS. **3**A-D illustrate a gripping insert assembly in accordance with one or more embodiments of the present disclosure;

FIGS. **4**A-B illustrate a carrier block of the gripping insert assembly shown in FIGS. **3**A-D;

FIGS. **5**A-B illustrate a gripping insert of the gripping insert assembly shown in FIGS. **3**A-D;

FIGS. **5**C-D illustrate a gripping insert of the gripping insert assembly shown in FIGS. **3**A-D;

FIG. **6** illustrates a shaft of the gripping insert assembly shown in FIGS. **3**A-D;

FIGS. **7**A-C illustrate steps in assembling the shaft in the carrier block of the gripping insert assembly shown in FIGS. **3**A-D; and

FIGS. **8**A-D illustrate steps in assembling the gripping insert and carrier block of the gripping insert assembly shown in FIGS. **3**A-D.

DETAILED DESCRIPTION

The aspects, features, and advantages of the invention mentioned above are described in more detail by reference to the drawings, wherein like reference numerals represent like elements. As used herein, "longitudinal" or "longitudinally" means of or relating to length or running lengthwise. As used herein, "latitudinal" or "latitudinally" means of or relating to width or running widthwise.

A quick-release gripping insert assembly suitable for use in a conventional coiled tubing injector unit **5** to grasp and hold coiled tubing is disclosed. FIG. **2** illustrates a conventional drive chain **7** of coiled tubing injector unit **5** having quick-release gripping insert assemblies attached. A pair of continuous parallel drive chains **7** revolve in a common plane and have opposed, elongated parallel runs spaced apart to form a path for engaging tubing passing there through. With reference to FIGS. **3**A-D, the quick-release gripping insert assembly **100** includes a carrier block **110** secured to the drive chain **7**, a gripping insert **140** coupled to the carrier block **110** with

a shaft **170** and locked in place on the carrier block **110** with a spring plunger **190**. The gripping insert **140**, carrier block **110** and shaft **170** may be steel, or other suitable materials known to one of ordinary skill in the art.

Referring now to FIGS. **4**A-B, perspective views of a carrier block **110** in accordance with one or more embodiments of the present disclosure are shown. The carrier block **110** may be formed as an integral component having an upper surface **112** and extruded tongue portions **114** extending from an opposite side of the carrier block **110** and away from the upper surface **112**. In certain embodiments, the upper surface **112** may be substantially planar. Alternatively, the upper surface **112** of the carrier block may be curvilinear or curved, either latitudinally, longitudinally, or both. For example, a curved upper surface may be convex or concave. The extruded tongue portions **114** have longitudinally aligned openings **115** through which roller bearings may be installed to ride on a skate plate (not shown) of the injector head. Additionally, the carrier block **110** includes one or more circular channels **117** through which one or more pins may be installed for securing the carrier block **110** to the drive chain **7**.

One or more pockets **116***a*, **116***b* may be formed in the upper planar surface **112** of the carrier block **110**. The pockets **116***a*, **116***b* may be machined (e.g., using computer numerical control ("CNC")) or integrally co-formed with the carrier block **110** (e.g., by forging or casting processes). The pockets **116***a*, **116***b* may be separated by a divider wall **118** there between. While two pockets are illustrated, in other embodiments the carrier block **110** may have a single pocket formed therein, while in still other embodiments the carrier block **110** may have more than two pockets formed therein (e.g., three or more).

The pockets **116***a*, **116***b* may be generally rectangular or square-shaped in a top view, although other geometries are possible as will be understood by one of ordinary skill in the art. Illustrated in FIG. **4**A, in certain embodiments, the pockets **116***a*, **116***b* may have a curved lower surface **120** which extends latitudinally and intersects the upper surface **112** at both ends of the pockets **116***a*, **116***b*. Longitudinally, the pockets **116***a*, **116***b* may be defined by two opposed end surfaces **122**. The end surfaces **122** may be substantially vertical opposing surfaces that extend downward from the upper surface **112** and intersect the lower curved surface **120**. In certain embodiments, intersections between the two end surfaces **122** and the curved bottom surface **120** may be beveled or rounded.

Illustrated in FIG. **4**B, in other embodiments, the pockets **116***a*, **116***b* may have a substantially flat lower surface **124**. Two opposed end surfaces **122** and two opposed side surfaces **126** may extend downward from the upper surface **112** to the substantially flat lower surface **124**. In certain embodiments, the two end surfaces **122** and two side surfaces **126** may be angled (i.e., relative to the upper surface **112** and flat lower surface **124**). In other embodiments, the two end surfaces **122** and two side surfaces **126** may be substantially vertical (i.e., perpendicular to the upper surface **112** and flat lower surface **124**). In yet other embodiments, intersections between the two end surfaces **122**, the two side surfaces **126**, and the bottom flat surface **124** may be beveled or rounded.

Referring to both FIGS. **4**A-B, the carrier block **110** has a latitudinally centrally located passageway **128** that extends longitudinally from end to end through the carrier block **110**. The passageway **128** is positioned to extend longitudinally through both pockets **116***a*, **116***b*. Further, the carrier block **110** includes a threaded port **130** in the upper surface **112** of the carrier block **110**. The threaded port **130** may be machined and threaded in the carrier block **110**. The threaded port **130** is located proximate to at least one of the pockets **116***a*, **116***b* for reasons that will be described in detail below. The threaded port **130** extends downward into the carrier block **110** from the upper surface **112**.

Referring now to FIGS. **5**A-B, perspective views of a gripping insert **140** in accordance with one or more embodiments of the present disclosure are shown. The gripping insert **140** may be formed as an integral component with an upper portion **142** of the gripping insert **140** having a channel **144** that extends in a longitudinal direction fully across the gripping insert **140** and is open at a first end **146** and a second end **148** of the gripping insert **140**. The channel **144** may be arranged and designed to grip coiled tubing. The channel **144** may be circular or may have angled flat surfaces. As shown, the channel **144** may have a plurality of transverse grooves **150** spaced longitudinally from the first end **146** to the second end **148** of the gripping insert **140**.

The gripping insert **140** has a lower surface **152** that is arranged and designed to contact the upper surface (**112** in FIGS. **4**A-B) of the carrier block **110** when the gripping insert is installed on the carrier block **110**, as will be described in more detail below. In certain embodiments, the lower surface **152** may be substantially planar corresponding to a substantially planar surface of the carrier block. Alternatively, the lower surface **152** of the gripping insert may be curvilinear or curved, either latitudinally, longitudinally, or both corresponding to a curvilinear or curved surface of the carrier block. For example, a curved lower surface may be convex or concave. Further, latitudinal lips **154** on a first end **146** and second end **148** of the gripping insert **140** may extend downward from the lower surface **152** away from the upper portion **142** of the gripping insert **140**. The latitudinal lips **154** are arranged and designed to extend downward past the upper surface (**112** in FIGS. **4**A-B) of the carrier block **110** when the gripping insert **140** is installed on the carrier block **110**.

Further, the gripping insert **140** includes one or more extruded tongue portions **156***a*, **156***b* that extend downward from the lower surface **152** away from the upper portion **142**. The extruded tongues **156***a*, **156***b* may be longitudinally positioned on the lower surface **152** of the gripping insert **140**. In certain embodiments, the extruded tongue portions **156***a*, **156***b* may be formed integrally with the upper portion **142**. In other embodiments, the extruded tongue portions **156***a*, **156***b* may be welded to the lower surface **152** of the gripping insert **140**. The one or more extruded tongue portions **156***a*, **156***b* are arranged and designed to correspond with and engage the one or more pockets **116***a*, **116***b* formed in the upper surface **112** of the carrier block **110**, as will be described below in more detail. The extruded tongue portions **156***a*, **156***b* may be arranged and designed having a thickness in the latitudinal direction that is substantially equal to half of a distance between end surfaces **122** of pockets **116***a*, **116***b*. In alternative embodiments, the extruded tongue portions **156***a*, **156***b* may have any latitudinal thickness. The extruded tongue portions **156***a*, **156***b* may be longitudinally located at a central portion of the lower surface **152** of the gripping insert **140**.

As illustrated in FIG. **5**A, in certain embodiments, the extruded tongue portions **156***a*, **156***b* may have a semi-circular cross-section (longitudinally), which corresponds with a geometry of the pockets **116** in the carrier block **110** having a lower curved surface **120** (shown in FIG. **4**A). As illustrated in FIG. **5**B, in other embodiments, the extruded tongue portions **156***a*, **156***b* may have a square-like or rectangular cross-section (longitudinally), which corresponds with a geometry of pockets **116** in the carrier block **110** having a flat bottom surface **124** (shown in FIG. **4**B). Other corresponding tongue

and pocket configurations and geometries are also possible and will be understood by one of ordinary skill in the art.

FIGS. **5**C-D illustrate a gripping insert **140** having tongue portions **156***a*, **156***b* which are attached or coupled to the lower surface **152** of the gripping insert **140**. Tongue portions **156***a*, **156***b* fit within a recess **143** machined or otherwise formed in the lower surface **152** of the gripping insert **140**. One or more threaded fasteners **157** may be used to secure the tongue portions **156***a*, **156***b* to the gripping insert **140**.

Referring to FIGS. **5**A-D, the tongue portions **156***a*, **156***b* have a centrally located first cutout **158**. In certain embodiments, the first cutout may be circular. Alternatively, the first cutout may be polygonal or non-circular. The first cutout **158** has a diameter that is substantially equal to a diameter of the passageway **128** through the carrier block **110**. The tongue portions **156***a*, **156***b* further include a peripheral cutout **160** that extends from the first cutout **158** to a distal end or edge of the tongue portions **156***a*, **156***b*. The peripheral cutout **160** has a width that is less than a diameter of the first cutout **158**.

Referring now to FIG. **6**, a perspective view of a shaft **170** in accordance with one or more embodiments of the present disclosure is shown. The shaft **170** may be a circular rod that is arranged and designed to be inserted into the passageway **128** extending longitudinally through the carrier block **110**. Alternatively, the shaft may have a polygonal or non-circular cross-section. A cross-sectional geometry of the shaft should correspond to a cross-sectional geometry of passageway **128** (FIGS. **4**A-B) and first cutout **158** (FIGS. **5**A-D). The shaft **170** may be solid or hollow longitudinally there through. A first end portion **172**, a second end portion **174**, and a central portion **176** of the shaft **170** have a first diameter, which substantially corresponds with an outer diameter of the passageway **128** extending longitudinally through the carrier block **110**, and an outer diameter of the first cutout **158** in the extruded tongue portions **156***a*, **156***b* of the gripping insert **140**. A first intermediate portion **178** and a second intermediate portion **180** of the shaft **170** have a second diameter, which substantially corresponds with a dimension of the peripheral cutout **160** of the extruded tongue portions **156***a*, **156***b* of the gripping insert **140**. The second diameter is less than the first diameter.

Referring to FIGS. **6** and **7**B, in certain embodiments, when the shaft **170** is inserted within the passageway **128** of the carrier block **110**, a first end portion **172** of the shaft **170** extends longitudinally within the passageway **128** from a first end of the carrier block **110** to substantially the center of the first pocket **116***a*. In other embodiments, the first end portion may extend longitudinally within one-quarter length of the pocket, or within three-quarters length of the pocket, or other pocket lengths.

A central portion **176** of the shaft **170** extends longitudinally within the passageway **128** in the divider wall **118** from a second end of the first pocket **116***a* to substantially the center of the second pocket **116***b*. In other embodiments, the central portion may extend longitudinally within one-quarter length of the pocket, or within three-quarters length of the pocket, or other pocket lengths.

A second end portion **174** of the shaft **170** extends longitudinally within the passageway **128** from a second end of the second pocket **116***b* to a second end of the carrier block **110**. A first intermediate portion **178** of the shaft **170** extends from substantially the center of the first pocket **116***a* to the second end of the first pocket **116***a* (i.e., where divider wall **118** begins). A second intermediate portion **180** of the shaft **170** extends from substantially the center of the second pocket **116***b* to the second end of the second pocket **116***b*. As shown, the first intermediate portion **178** and the second intermediate portion **180** of the shaft **170** extend longitudinally only within the first and second pockets **116***a*, **116***b*, respectively. That is, an interface between said first and second diameters is longitudinally disposed within said pocket.

As shown in FIGS. **3**B and **7**C, the spring plunger **190** is a commonly used spring-loaded device that will be known to one of ordinary skill in the art. The spring plunger **190** includes a hollow cylindrical body with external threads that engage internal threads of the port **130** in the planar upper surface of the carrier block. A plunger member is disposed within the hollow cylindrical body along with a spring (of any kind), which biases the plunger within the hollow cylindrical body in one direction, so that an end or tip of the plunger member extends beyond the cylindrical body. Accordingly, the plunger member may be depressed (against the spring) so that the end of the plunger member is longitudinally aligned with an end of the cylindrical body. When released, the end of the plunger member extends longitudinally past the end of the cylindrical body.

In one aspect, embodiments disclosed herein relate to a gripping insert assembly used in a coiled tubing injector unit including a carrier block having an upper surface, at least one pocket formed in said upper surface, and a passageway substantially latitudinally centered and extending longitudinally there through, a shaft corresponding to a cross-section of said passageway of said carrier block, said shaft including at least a first end portion and a central portion having a first shaft diameter, and an intermediate portion having a second shaft diameter, wherein said first shaft end portion extends longitudinally within said pocket, and wherein said intermediate shaft portion extends longitudinally within said pocket, and a gripping insert having at least one tongue portion corresponding to said pocket in said upper surface of said carrier block, wherein said tongue portion comprises a first cutout substantially corresponding to said first shaft diameter, and a second cutout substantially corresponding to said second shaft diameter.

Methods of assembling the gripping insert and the carrier block is a two-step process: first the shaft is installed into the carrier block (shown in FIGS. **7**A-C), then the gripping insert is coupled with the carrier block (shown in FIGS. **8**A-D). Referring to FIGS. **7**A-C), the shaft **170** is inserted into the passageway **128** of the carrier block **110** so that ends of the shaft **170** are flush with ends of the carrier block **110** (FIG. **7**A). The carrier block **110** is then installed between the drive chains **102** (FIG. **7**B). Next, the spring plunger **190** is installed into the port **130** in the planar upper surface of the carrier block **110** (FIG. **7**C). The plunger **190** may be threaded, or alternatively may be press fit or otherwise within the port **130**.

Referring to FIGS. **8**A-D, to couple the gripping insert **140** with the carrier block **110**, extruded tongue portions of the gripping insert **140** are longitudinally aligned with pockets of the carrier block **110**, and more particularly with first and second intermediate portions of the shaft **170** that extend longitudinally within pockets (i.e., intermediate portions having the smaller diameter). Extruded tongues of the gripping insert **140** are vertically inserted (as indicated by arrow A) into the pockets of the carrier block **110** until the planar bottom surface of the gripping insert **140** contacts and sits flush with the planar upper surface of the carrier block **110** (FIG. **8**A). Lips **154** (FIGS. **5**A-B) extend downward past the planar upper surface of the carrier block and provide alignment and indication that the gripping insert **140** is properly engaged with the carrier block **110**. The planar bottom surface of the gripping insert **140** also depresses the spring plunger **190** flush with the planar upper surface of the carrier block

110. During vertical installation of the gripping insert **140**, the peripheral cutouts in the extruded tongues initially engage the first and second intermediate portions of the shaft **170**. Subsequently, when the planar bottom surface of the gripping insert **140** contacts the planar upper surface of the carrier block **110**, the first and second intermediate portions of the shaft **170** are concentrically positioned within the circular cutouts (having a first diameter) of the extruded tongues.

The gripping insert **140** is then horizontally moved (indicated by arrow B) to engage the circular cutouts of the extruded tongue portions with the first end portion and central end portion (both having a first diameter) of the shaft **170** extending within the pockets (FIG. **8**B). Engagement of the circular cutouts with the first diameter portions of the shaft **170** precludes vertical movement of the gripping insert (indicated by arrow A). The gripping insert **140** is slid horizontally until the extruded tongues contact end surfaces of the first and second pockets, at which point a full width of the extruded tongues is engaged with the first diameter portions of the shaft **170** within the pockets.

Also, spring plunger **190**, which was depressed within the port by the planar lower surface of the gripping insert **140**, is biased upward and locks the gripping insert **140** in place (FIG. **8**C-D). Particularly, an end of the plunger member is biased upward by the internal spring to a position above the planar upper surface of the carrier block **110**, which prevents the gripping insert from moving in a horizontal direction (indicated by arrow B).

Quick disassembly of decoupling of the gripping insert **140** from the carrier block **110** proceeds in a manner opposite of assembly. The spring plunger **190** is depressed to allow the gripping insert **140** to slide horizontally (opposite of the direction indicated by arrow B) to move the circular cutouts in extruded tongues into longitudinal alignment over the first and second intermediate portions of the shaft **170**. Then, the gripping insert **140** is lifted vertically (opposite the direction indicated by arrow A) to allow second cutouts of the extruded tongues to pass over and disengage from the first and second intermediate portions of the shaft **170**.

In certain aspects, embodiments disclosed herein relate to a method of assembling a gripping insert assembly including providing said gripping insert assembly including a carrier block having an upper surface, one or more pockets formed in said upper surface, and a passageway latitudinally centered and extending longitudinally there through, a shaft arranged and designed to be inserted within said passageway of said carrier block, said shaft including a first end portion, a second end portion, and central portion having a first shaft diameter, and a first intermediate portion and a second intermediate portion having a second shaft diameter, and a gripping insert having a lower surface and one or more tongue portions corresponding to said one or more pockets in said upper surface of said carrier block, wherein said tongue portions include a circular cutout corresponding with said first shaft diameter, and a peripheral cutout corresponding with said second shaft diameter. The method further includes inserting the shaft within said passageway of said carrier block, wherein said first shaft end portion and first intermediate shaft portion extend longitudinally within said pocket, and wherein said central shaft portion and second intermediate shaft portion extend longitudinally within said pocket, inserting said tongue portions of said gripping insert into said pockets of said carrier block until said lower surface of said gripping insert contacts and sits flush with said upper surface of said carrier block, wherein said tongue portions engage said first and second intermediate shaft portions, and sliding said gripping insert horizontally until said tongue portions are longitudinally aligned with said first shaft end portion and central portions.

Advantageously, embodiments disclosed herein for quick-release gripping inserts reduces time required to replace the gripping inserts in a number of situations. For example, gripping inserts may be replaced to use different sizes of coiled tubing based on particular applications. Additionally, gripping inserts may need to be replaced due to wear or damage. Accordingly, rig downtime due to maintenance or replacement of gripping inserts is greatly reduced, which in turn reduces costs and increases productivity of the coiled tubing operation.

The claimed subject matter is not to be limited in scope by the specific embodiments described herein. Indeed, various modifications of the invention in addition to those described herein will become apparent to those skilled in the art from the foregoing description. Such modifications are intended to fall within the scope of the appended claims.

What is claimed is:

1. A coiled tubing injector unit insert assembly comprising:

a carrier block having a carrier block pocket;

a shaft extending through the carrier block pocket, the shaft having a first diameter portion and a second larger diameter portion, and a junction between the two shaft diameters that is located within the carrier block pocket; and

a gripping insert having a tongue, the tongue comprising at least a first cutout configured to engage the shaft extending through the carrier block pocket and couple the gripping insert to the carrier block, and a peripheral cutout having a width less than the diameter of the first cutout.

2. The insert assembly of claim **1**, wherein the gripping insert is configured to slide longitudinally with respect to the carrier block to couple the gripping insert to the carrier block.

3. The insert assembly of claim **1**, wherein the peripheral cutout transitions to the larger first cutout.

4. The insert assembly of claim **1**, wherein the first cutout is substantially the same size as the second larger shaft diameter portion.

5. The insert assembly of claim **1**, further comprising a depressible biased mechanism in the carrier block for restricting movement of the gripping insert relative to the carrier block.

6. The insert assembly of claim **1**, wherein the shaft is removable from the carrier block.

7. The insert assembly of claim **1**, wherein the shaft is disposable within a passageway extending longitudinally through the carrier block.

8. The insert assembly of claim **1**, wherein the carrier block pocket comprises a curved lower surface.

9. The insert assembly of claim **1**, wherein a longitudinal cross-sectional geometry of the gripping insert tongue substantially corresponds with a latitudinal cross-sectional geometry of the carrier block pocket.

10. The insert assembly of claim **1**, wherein the junction between the two shaft diameters is substantially centered longitudinally with the carrier block pocket.

11. The insert assembly of claim **1**, the tongue portion having the peripheral cutout substantially the same size as the smaller shaft diameter and the substantially central first cutout the same size as the larger shaft diameter.

12. The insert assembly of claim 1, wherein the tongue has a latitudinal thickness less than a longitudinal distance between end surfaces of the carrier block pocket.

13. A coiled tubing conveying apparatus comprising:

a pair of continuous parallel drive chains revolving in a common plane, said pair of continuous drive chains having opposed, elongated parallel runs spaced apart to form a path for engaging tubing passing there through; and

a plurality of gripping insert assemblies carried on each of said pair of continuous drive chains, each comprising a gripping insert configured to be coupled to a carrier block, the insert comprising:

a tongue with a first cutout configured to engage a shaft extending within a carrier block pocket,

wherein the shaft is configured having a first diameter portion and a second larger diameter portion substantially the same size as the first cutout, and a junction between the two shaft diameters that is located within the carrier block pocket to couple the gripping insert to the carrier block.

14. The insert assembly of claim 13, further comprising a depressible biased mechanism in the carrier block for restricting movement of the gripping insert relative to the carrier block.

15. The insert assembly of claim 13, wherein the junction between the two shaft diameters is substantially centered longitudinally with the carrier block pocket.

16. A method of assembling a coiled tubing injector unit insert assembly comprising:

providing a gripping insert configured to be coupled to a carrier block, the insert comprising a tongue with a first cutout configured to engage a shaft extending within a carrier block pocket, the shaft having a first diameter portion and a second larger diameter portion and a junction between the two shaft diameters that is located within the carrier block pocket to couple the gripping insert to the carrier block;

inserting the gripping insert tongue into the carrier block pocket until the first cutout is substantially concentrically aligned with the larger shaft diameter portion;

sliding the gripping insert in a first direction and causing the first cutout in the tongue to engage the larger shaft diameter portion, thereby coupling the gripping insert to the carrier block; and

using a locking mechanism when the first cutout has engaged the larger shaft diameter portion, thereby restricting the gripping insert from sliding in a direction opposite the first direction.

17. The method of claim 16, further comprising installing the shaft within a passageway extending longitudinally within the carrier block.

18. The method of claim 16, further comprising substantially aligning, in the longitudinal direction relative to the carrier block, the gripping insert tongue with the first diameter shaft portion prior to inserting the tongue into the carrier block pocket.

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