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(54) **Title:** TOOL SAFETY STRAP

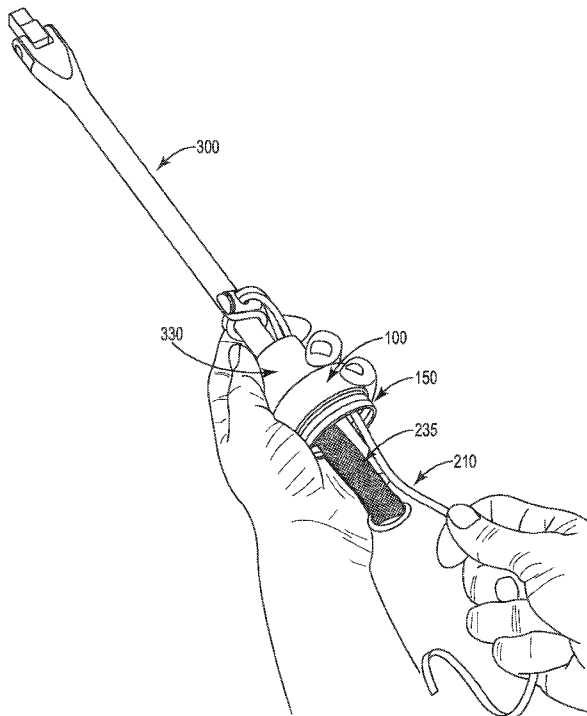
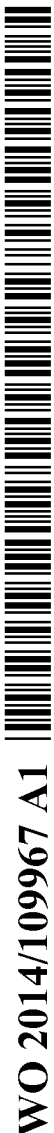


Fig. 8

(57) **Abstract:** The present disclosure is directed to a novel way of attaching a safety strap to a hand tool where the hand tool does not have a readily available means of connecting such a strap. In one aspect of the disclosure, a rubber sleeve is stretched over a removable core that is then placed over the handle of the hand tool and the safety strap such that the strap is between the sleeve and handle. The rubber sleeve is then released from the core, and the safety strap is held securely by the constructing rubber sleeve.



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TOOL SAFETY STRAP

CLAIM OF BENEFIT TO PRIOR APPLICATIONS

5 This application claims the benefit of U.S. Provisional Application No. 61/751990 filed January 14, 2013 and U.S. Utility Application No. 14/020929 filed on September 9, 2013, the entirety of which are hereby fully and completely incorporated herein by reference.

FIELD

10 The present invention relates generally to a safety strap for hand tools. More particularly, the present invention relates to an improved way of attaching a safety strap to a hand tool by using a constricting rubber sleeve.

BACKGROUND

15 With the increasing expense and weight of power and unpowered hand tools, there came recognition of the penalty associated with dropping such a tool. Power hand tools are often damaged when they are dropped, and falling hand and power hand tools can injure persons and
20 property if dropped from an elevated position.

 As a result of these circumstances, attachment devices have been devised to secure hand tools from such a drop. Some tools are manufactured with captive holes to allow the connection of a safety line. Further, lanyards and D-rings have been built into many hand power tools to allow attachment of lines to the tool at one end and a user's body at the other. For example, *see*
25 U.S. patent 6,487,756 to Vidal.

 Many power and unpowered hand tools, however, have no such means to attach a safety line. As a result various methods have been devised to add a safety line or lanyard to a tool that was not originally so configured.

One method is to tape a safety strap to the handle of such a tool. Python Safety, Inc. makes such a tape called Quickwrap Tape™ for this purpose. Another method is used by Tool Safety Solutions LTD, and involves placing heat sensitive tape over a section of a safety strap located adjacent the tool handle, and then apply heat to the tape allowing it to shrink and hold the
5 section of strap in place.

A disadvantage of the tape method is that tape can lose its adhesive properties over time. Such loss of adhesion can be accelerated under use in harsh environmental conditions. The degradation of the adhesive property of tape may not be readily apparent, creating uncertainty when the tool safety strap connection might fail. This creates a safety hazard, especially when
10 using tape to secure heavier tools that are especially dangerous when dropped.

The heat shrink method has disadvantages as well. The heating step might cause heat related damaged to the tool handle and/or the safety strap. If the heat shrink sleeve is over heated, the safety strap, or the heat shrink material itself, might well be weakened by the heating process and such a problem might go undetected. An unexpected failure of the safety strap
15 might then occur. Further, the heating step can release undesirable toxic combustion products. In addition, heat shrink sleeves require use of a thin walled material which is required for optimum rate of heat conduction and process safety of the heat shrink sleeve. Such a thin-walled product may not be durable enough to withstand the weight of a heavy tool, especially under the stress of a dropped tool that is restrained by a safety strap held in place only by the heat shrink
20 sleeve. The thin walled heat shrink material may also not withstand harsh environmental conditions.

Therefore, there is an unfulfilled need for a better and safer way of attaching a safety strap to a hand tool that does not possess a captive hole or built in safety strap.

SUMMARY

The present disclosure is directed to tool safety, particularly an improved way of attaching a safety strap to a hand tool or other object.

5 This summary is not intended to limit the scope of the invention, or describe each embodiment, implementation, feature or advantage of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

10 Figure 1 is a perspective view of elastic sleeve 100.

Figure 2 is a perspective view of removable core 150.

Figure 3 is a perspective view of elastic sleeve 100 mounted on removable core 150.

Figure 4 is a perspective view of safety strap 230.

Figure 5 is a perspective view of safety strap 230 cinched to a hand tool.

15 Figure 6 is a perspective view of a step in the application of the invention to breaker bar 300.

Figure 7 is a perspective view of a step in the application of the invention to breaker bar 300.

20 Figure 8 is a perspective view of a step in the application of the invention to breaker bar 300.

Figure 9 is a perspective view of a step in the application of the invention to breaker bar 300.

DETAILED DESCRIPTION

25 Using materials with elastic properties to provide a water tight seal is known to those in the electronic arts. Such a process is described in the application for Canadian patent 2,128,470, which is fully and completely incorporated into this specification by reference. Such a process, however, has a new, novel and unforeseen application as described below.

30 The advantages of this invention include that it can be used to attach a safety strap to a hand tool that does not have a captive hole or other built in means to attach a safety strap. This invention also has the advantage that a safety strap can be attached to a hand tool without

requiring the application of heat or adhesive tape. This invention uses a thick rubber sleeve that provides better support that can safely secure a safety strap on to heavier tools. The thicker material is also more resilient and weather resistant. Further, the eventual failure of adhesive type tape, or a thin heat shrink sleeve, may be avoided. Also, the application of the safety strap
5 to a tool may be made in the field without the requirement of special tools, such as a heat source, for installation. It is also a faster and more efficient means of securing a safety strap to a hand tool.

Referring to Figures 1 – 3, elastic sleeve 100 of the invention is preferably constructed in open-ended cylindrical sections with lengths and diameters dependent upon the weight and size
10 of the tool to which it will be applied. Elastic sleeve 100 is preferably constructed of rubber or silicone rubber and preferably ethylene propylene diene monomer rubber. An EPDM rubber compound that has a specific gravity between 1.075 and 1.120 is preferred. Using EPDM rubber with this property provides good thermal stability, a tight seal, and years of resiliency and pressure. It also allows for the ease of mounting on removable core 150. Elastic sleeve 100
15 made from EPDM rubber is also very resistant to fungus, ozone, alkalies and acids. Other elastic materials may also be used.

Elastic sleeve 100 consists of wall width 110 that preferably measures between .165 and .185 inches in thickness. Elastic sleeve 100 has a relaxed interior diameter 120, a relaxed exterior diameter 130 and a length 140. The length 140 and relaxed interior diameter 120 of
20 elastic sleeve 100 is dependent upon the tool handle exterior diameter and the weight of the tool. For example, a five pound tool with a handle of between .75 and 1.5 inches in diameter would preferably use a sleeve of at least three inches in length and a relaxed interior diameter of about .5 inches. Such a configuration would allow a tool so equipped to be dropped from six feet and

have its fall safely arrested by the safety strap without failure of the connection. It is preferred that the ratio of relaxed interior diameter 120 of elastic sleeve 100 to the exterior diameter of the tool handle is not greater than .7, and preferably between .3 and .67. Tools in the five pound range can be preferably equipped with a sleeve of at least 3 inches in length, whereas a tool in
5 the 15 pound range would preferably use a sleeve of about 6 inches in length. It is preferred that the ratio of sleeve length 140 in inches to the weight of the tool in pounds remain between .4 to .6.

Removable core 150 is a hollow core cylinder that defines volume 160, and has a length 170, an exterior diameter 180 and an interior diameter 175. Removable core 150 is preferably
10 constructed of a single strand of material 190 connected by perforations 200 at its periphery, and in a spiral fashion, to form removable core 150. Detached strand 210 is preferably fed through volume 160 from its originating attachment to core 150, to the opposite end of core 150. The removal of core 150 is preferably achieved by continuously pulling the detached strand of material 210 through volume 160 thereby continuously unraveling core 150.

15 Elastic sleeve 100 is stretched and mounted onto removable core 150. It is preferable that the exterior diameter 180 of removable core 150 be 3 to 4 times the relaxed interior diameter 120 of elastic member 100. Such application will allow for an interior diameter 175 that will allow for a broad range of applications onto tool handles with varying exterior diameters. It is also preferable that when elastic member 100 is mounted on removable core 150 that removable core
20 150 be equal to or longer than length 140 of elastic sleeve 100.

Referring to Figures 4 – 5, safety strap 230 is comprised of attachment end 235, which preferably includes D-ring 240, and Tool end 250. D-ring 240 in safety strap 230 can then be used to tether safety strap 230 to a user by means of carabineer or other connection means known

to those of skill in the art. Safety strap 230 may also be configured to terminate in a loop of material. Tool end 250 of safety strap 230 is preferably configured to allow safety strap 230 to be attached to the handle of a hand tool by choke type connection 260.

Figures 6 - 9 depict an exemplary application of the invention onto breaker bar 300.

5 Referring to Figure 6, safety strap 230 is cinched onto breaker bar 300 by cinch knot 250. With elastic sleeve 100 mounted on removable core 150, handle 320 of breaker bar 300 is placed into volume 160 of removable core 150. Detached strand 210 originates on the end of removable core 150 closest to cinch connection 250, and is fed through the length of volume 160 of core 150 such that strand 210 extends from removable core 150 on the opposite end from which it
10 originates. Safety strap 230 is run through volume 160 of core 150 (as shown in Figure 7) such that it exits core 150 on the same end of core 150 as detached strand 210.

Referring now to Figures 7 – 8, detached strand 210 is continuously pulled through volume 160 of removable core 150 allowing removal of core 150 and the subsequent constriction 330 of elastic sleeve 100. This removal process facilitates the removal of core 150 by allowing
15 strand 210 to remain substantially clear of constricting elastic sleeve 100 during the core 150 removal process.

Figure 9 depicts breaker bar 300, with removable core 150 removed, and elastic sleeve 100 constricted onto handle 320 thereby securing safety strap 230 to breaker bar 300.

While the invention has been described in connection with what is presently considered
20 to be the most practical and preferred embodiments, it will be apparent to those of ordinary skill in the art that the invention is not to be limited to the disclosed embodiments. It will be readily apparent to those of ordinary skill in the art that many modifications and equivalent arrangements can be made thereof without departing from the spirit and scope of the present

disclosure, such scope to be accorded the broadest interpretation of the appended claims so as to encompass all equivalent structures and products. For example, the dimensions and proportions indicated in the figures may be altered without departing from the scope of the invention.

For purposes of interpreting the claims for the present invention, it is expressly intended
5 that the provisions of Section 112, sixth paragraph of 35 U.S.C. are not to be invoked unless the specific terms "means for" or "step for" are recited in a claim.

CLAIMS

What is claimed is:

1. A system for attaching a safety strap to a hand tool comprising:
 - a hand tool having a handle, the handle having an exterior diameter;
 - 5 a safety strap adjacent to the handle;
 - a removable hollow core defining a volume and having an interior and an exterior diameter, the interior diameter being greater than the exterior diameter of the handle;
 - an elastic sleeve having a length, a relaxed interior diameter, a stretched interior diameter, and a relaxed exterior diameter, wherein the difference between the relaxed exterior
 - 10 diameter and the relaxed interior diameter define a wall width, the relaxed interior diameter is less than the exterior diameter of the handle, and the stretched interior diameter is greater than the exterior diameter of the removable hollow core; and,
 - wherein the elastic sleeve is mountable on the removable hollow core, and the removable hollow core is configured to be removed while the handle and safety strap are within its
 - 15 volume.
2. The system of claim 1 wherein the elastic sleeve is made of a rubber.
3. The system of claim 2 wherein the rubber is ethylene propylene diene monomer rubber.
4. The system of claim 1 wherein the elastic sleeve has a length between 3 and 6 inches.
5. The system of claim 1 wherein the elastic sleeve wall width is between .165 and .185 inches.
- 20 6. The system of claim 1 wherein the ratio of the length of the elastic sleeve in inches to the hand tool weight in pounds is between .4 and .6.
7. The system of claim 1 wherein the ratio of the relaxed interior diameter of the elastic sleeve in inches to the exterior diameter of the handle in inches is less than .7 but greater than .3.

8. A method of applying a safety strap to a handle comprising:

stretching an elastic sleeve onto a hollow removable core;

placing a strap adjacent a handle;

inserting the handle with adjacent strap into the hollow removable core;

5 removing the hollow removable core and allowing the elastic sleeve to contract onto the handle and strap.

9. The method of claim 8 wherein the elastic sleeve is comprised of rubber.

10. The method of claim 8 wherein the elastic sleeve has a length between 3 and 6 inches.

11. A system for attaching a strap to an object comprising:

10 a hollow cylinder configured to be removably destructed and having an interior and exterior diameter and a length;

an elastic cylinder configured to be stretched over the exterior diameter of the hollow cylinder;

a strap with a length, the length of the strap being greater than that of the hollow cylinder;

15 an object having a portion with an exterior diameter less than the interior diameter of the hollow cylinder; and,

wherein the elastic cylinder is stretched over a portion of the exterior diameter of the hollow cylinder and the strap is place adjacent to the object portion and the object portion and strap are placed within the hollow cylinder and the hollow cylinder is destructed and

20 removed from the hollow cylinder whereby the elastic cylinder constricts onto the object and strap.

12. A kit to attach a safety strap to the handle of a hand tool, comprising:

a removable core defining a volume and having an exterior diameter, an interior diameter, and a length;

a rubber sleeve stretched onto the removable core, the rubber sleeve having a length and relaxed interior and exterior diameters, wherein the difference between the interior and exterior diameters define a wall width, and wherein the interior diameter is 3 to 4 times smaller than the exterior diameter of the removable core upon which it is stretched, and wherein the ratio of the length of the elastic sleeve in inches to the weight in pounds of the hand tool to which a safety strap is to be attached is between .4 and .6, and having a wall width; and,

wherein the safety strap is configured on one end to attach to a user of a hand tool, and wherein the safety strap has a length greater than the length of the removable core.

13. The kit of claim 12 wherein the rubber sleeve wall width is between .165 and .185 inches.

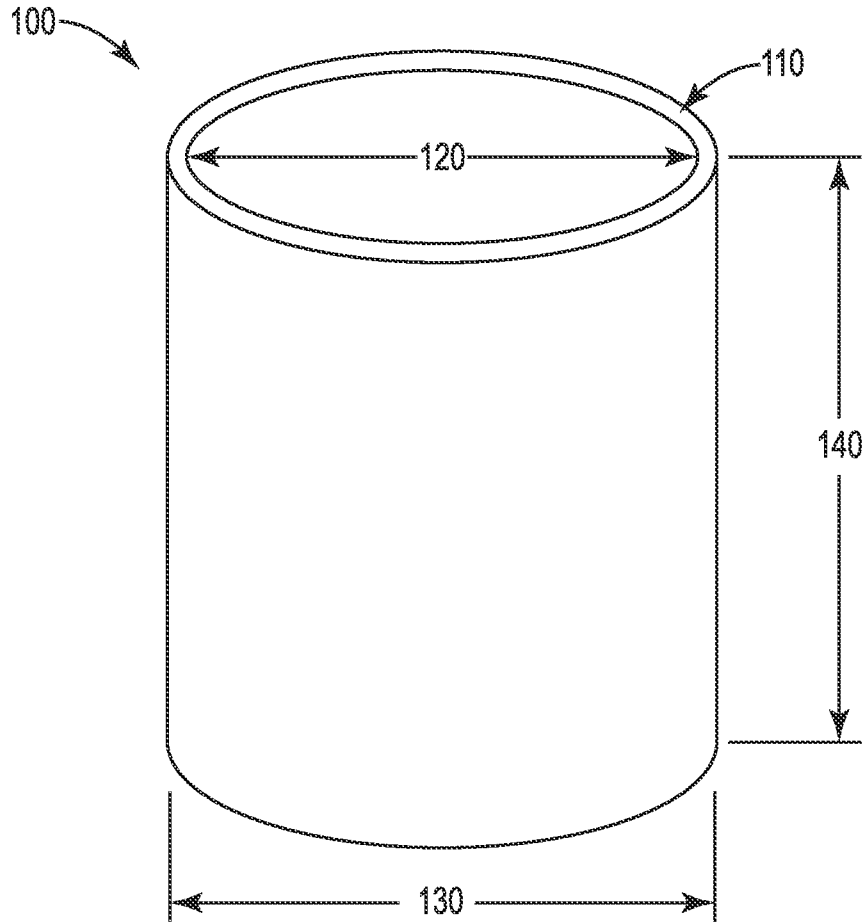


Fig. 1

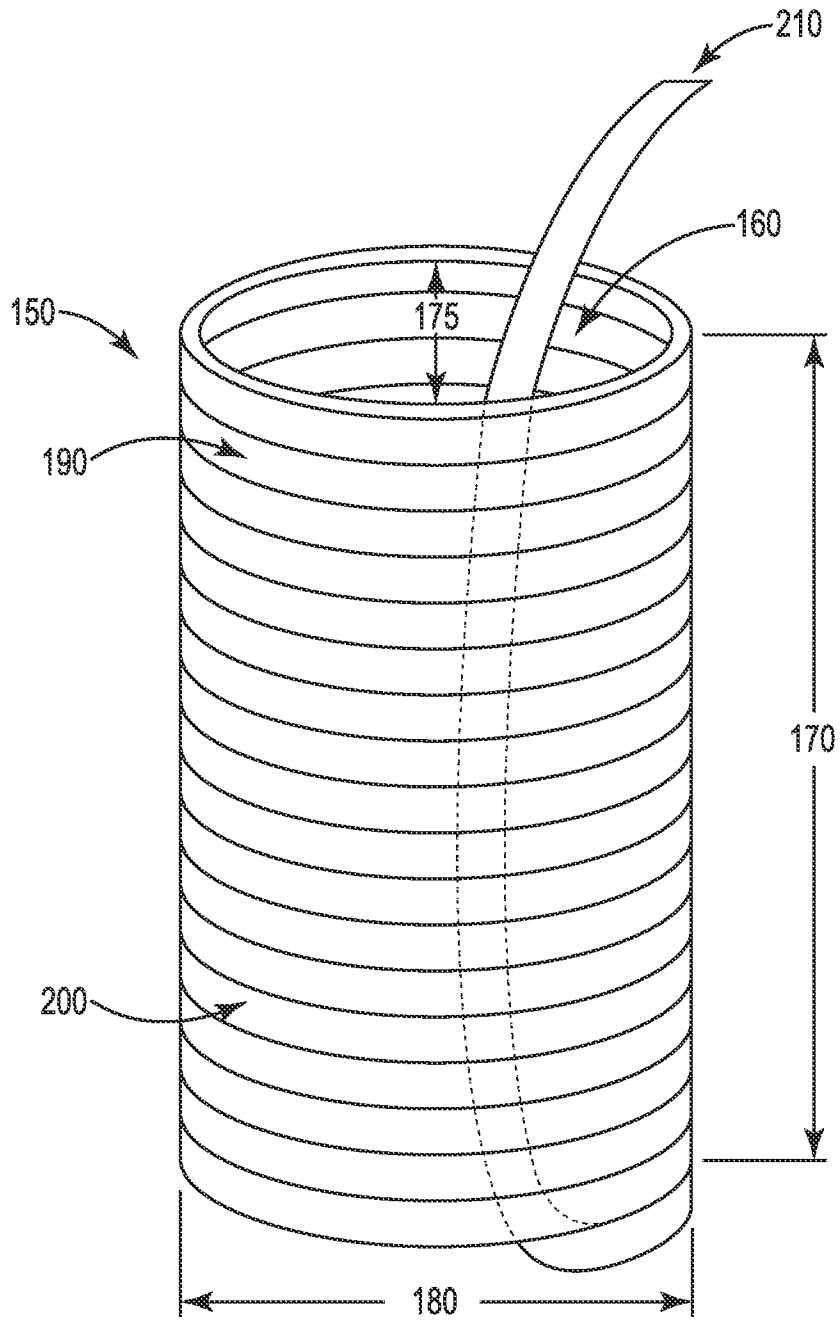


Fig. 2

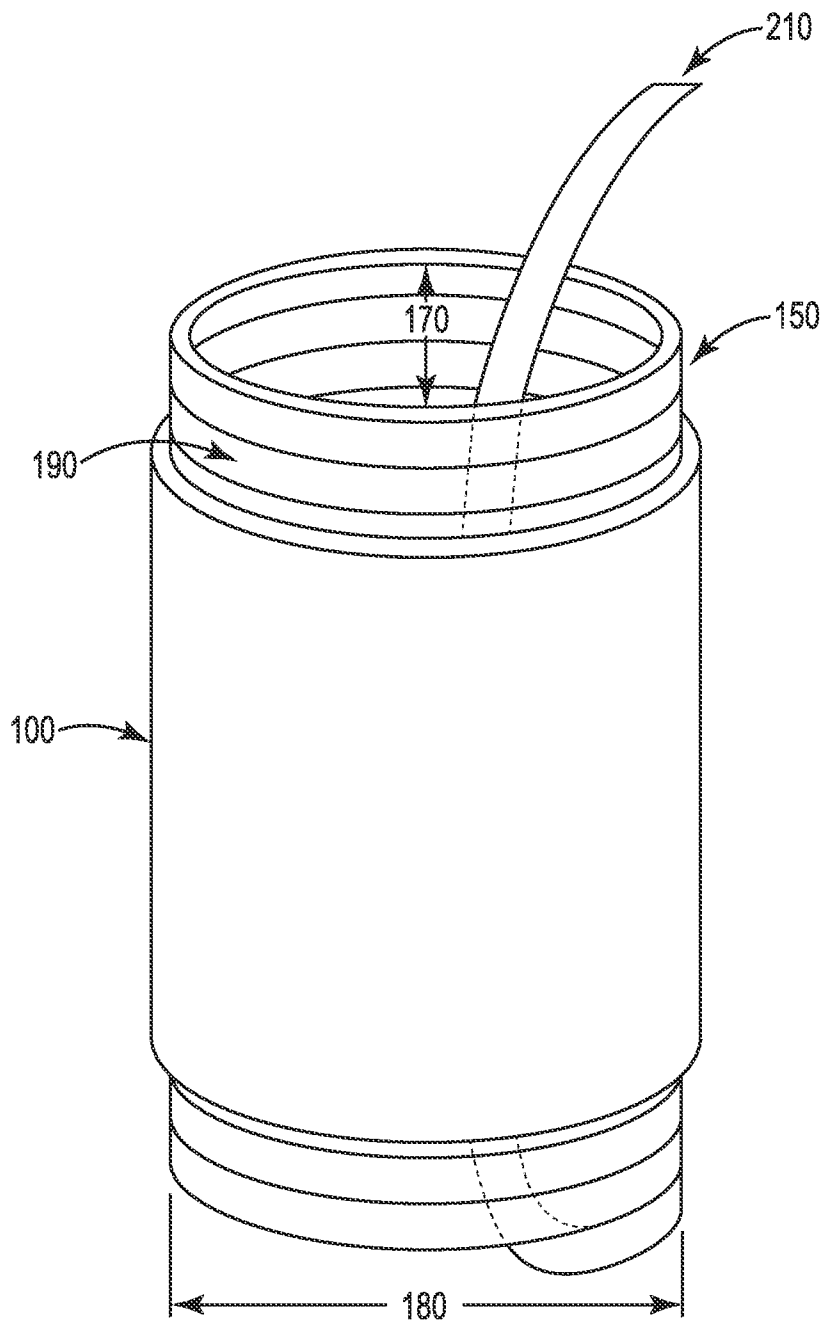


Fig. 3

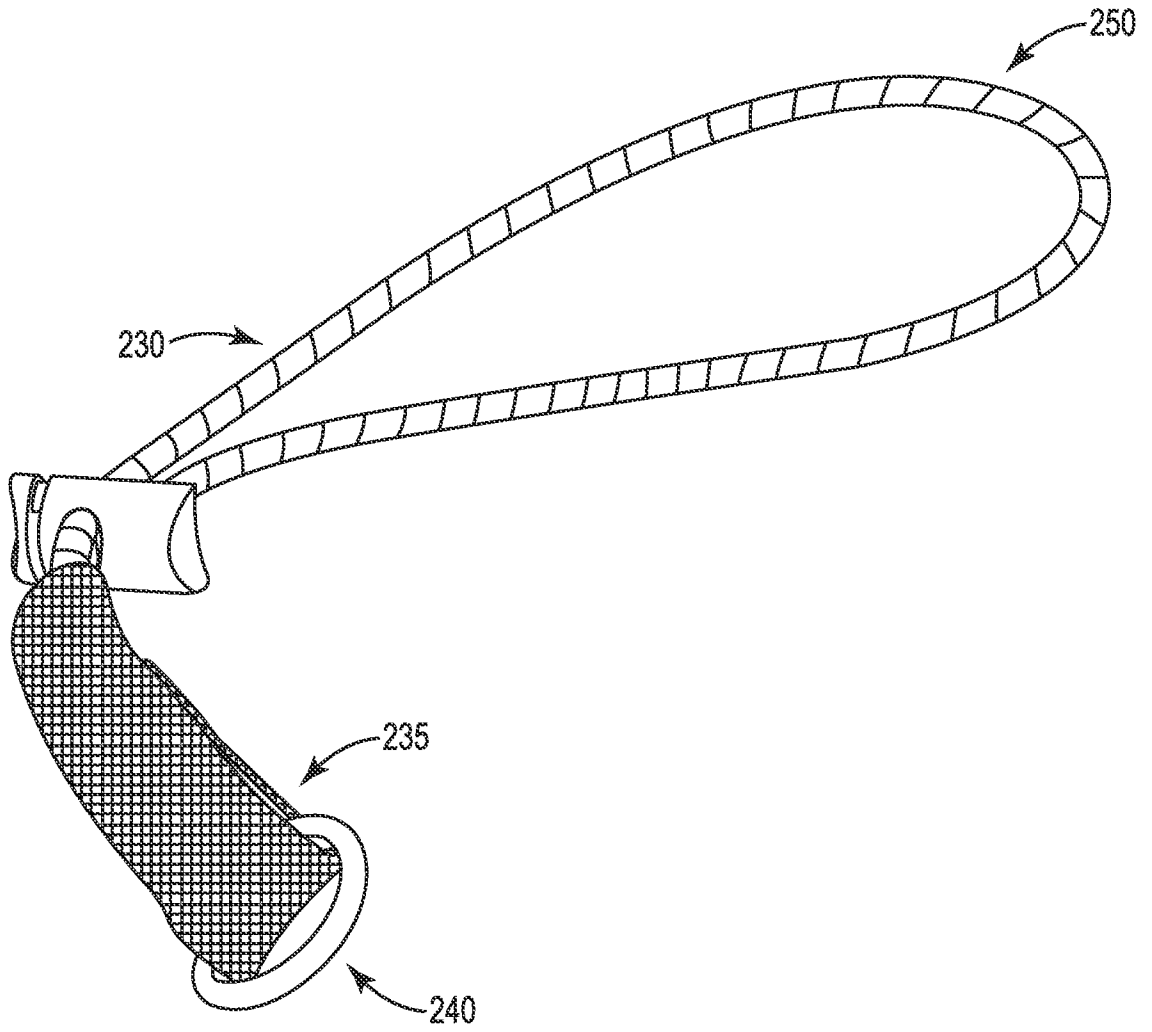


Fig. 4

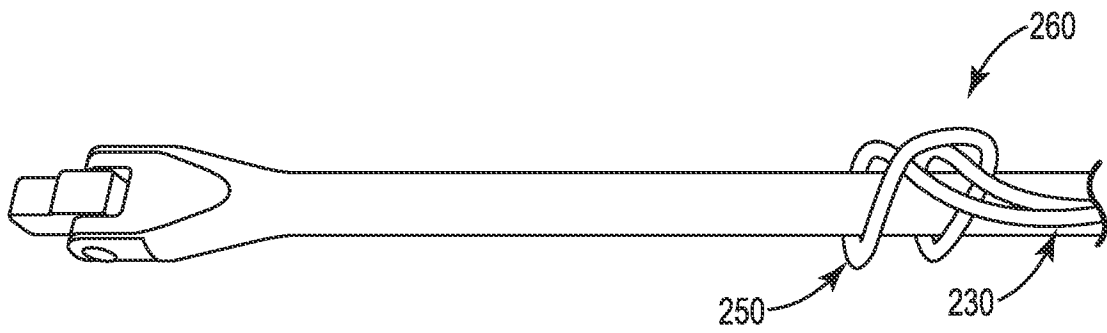


Fig. 5

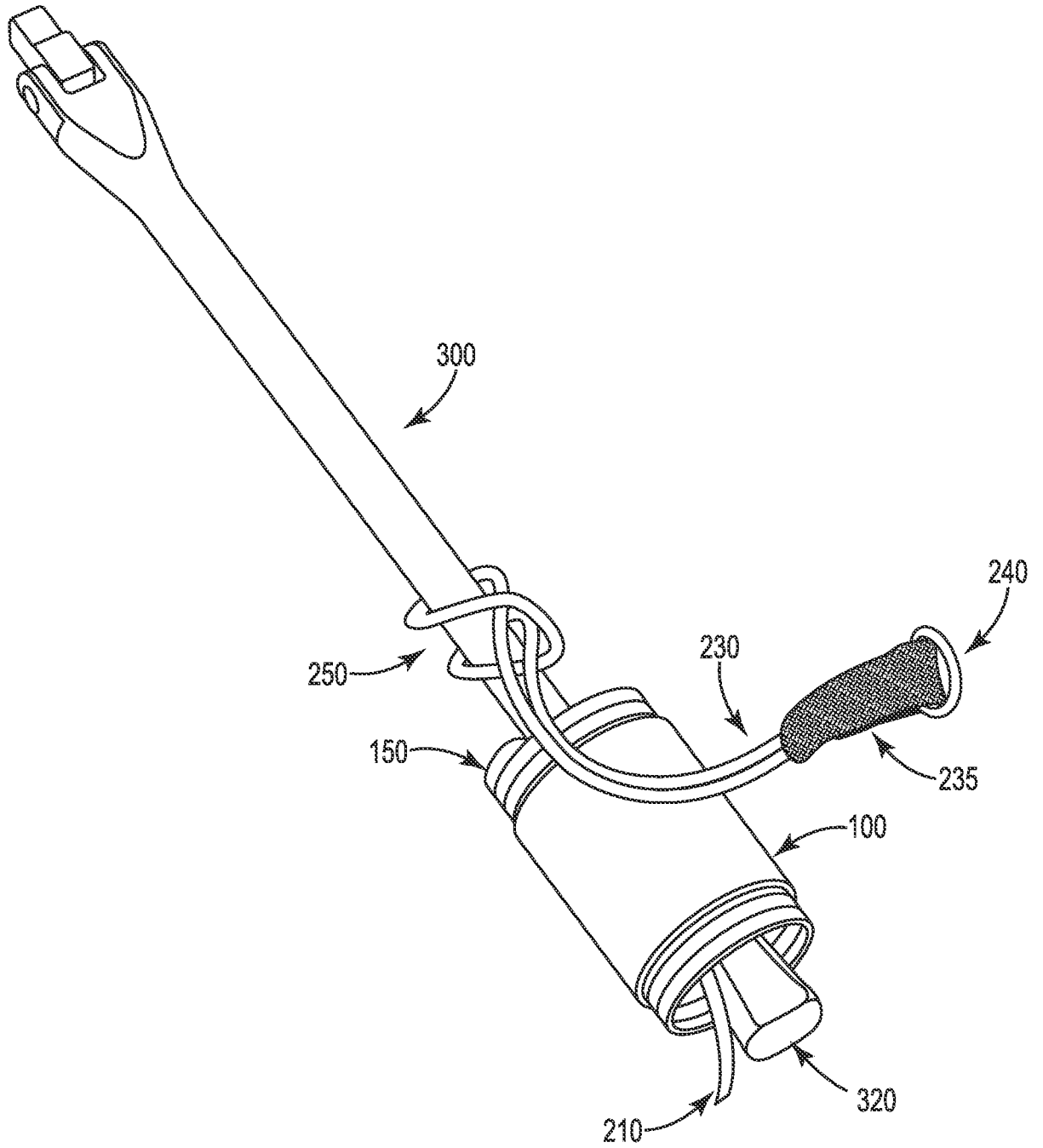


Fig. 6

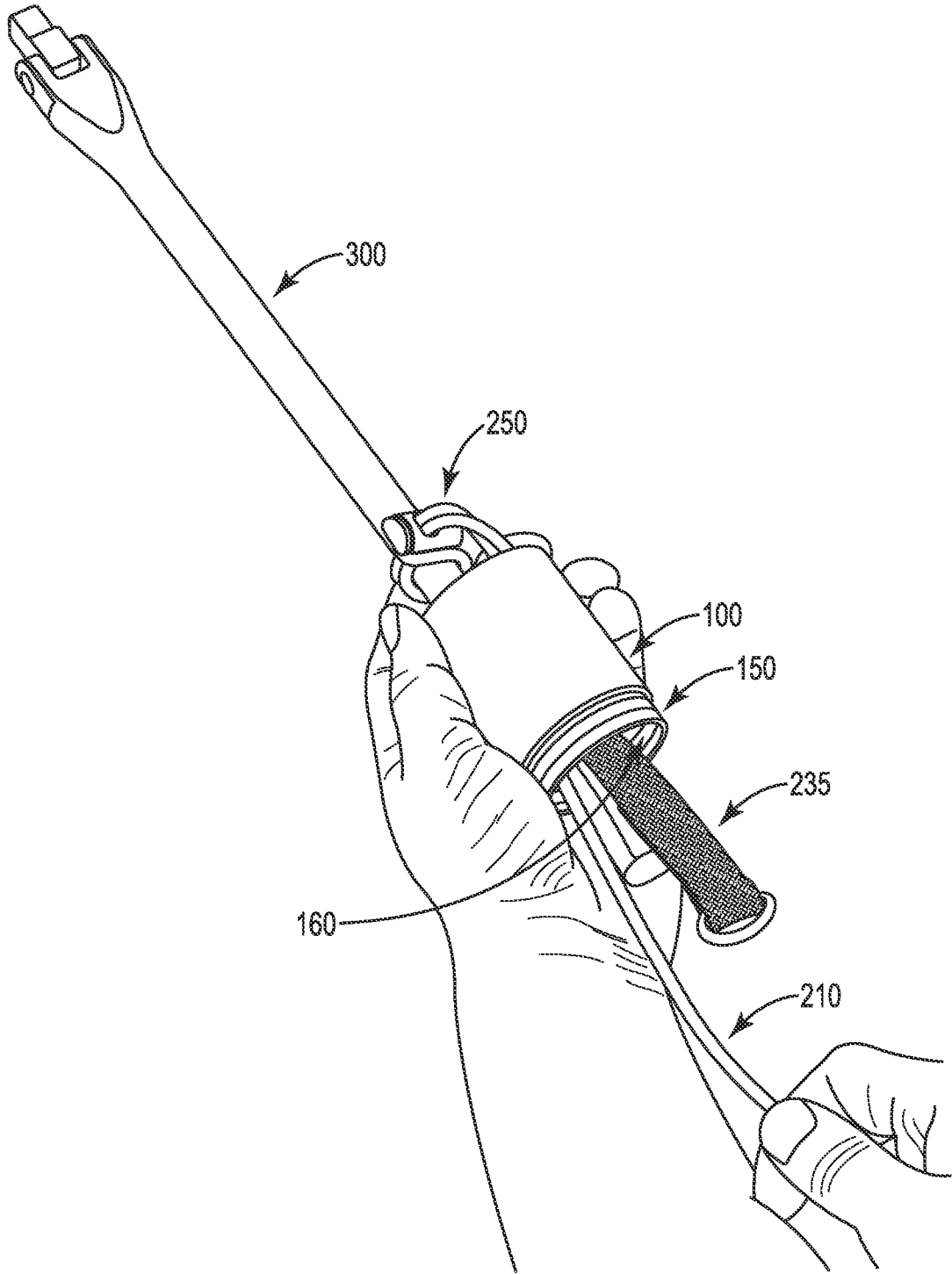


Fig. 7

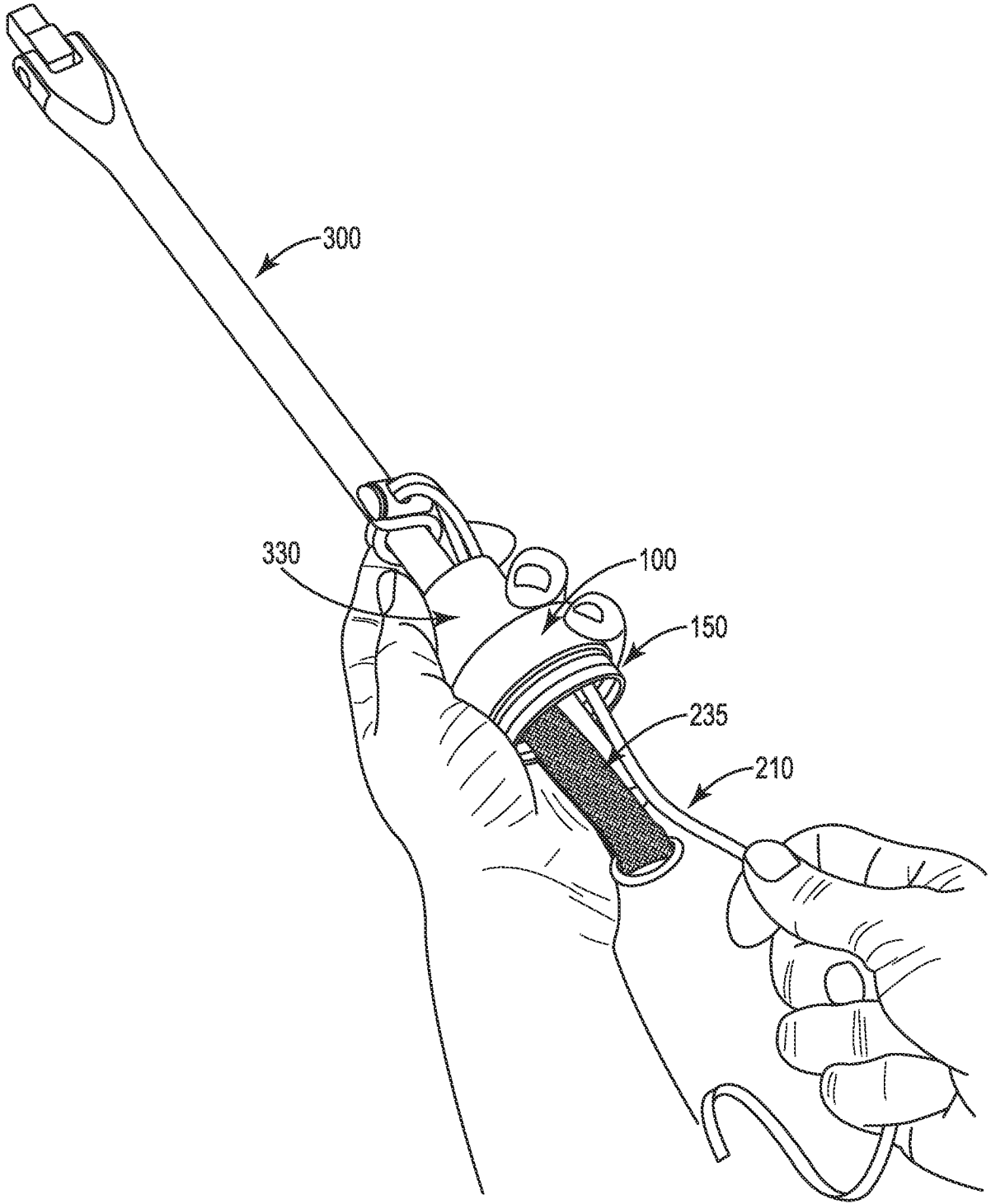


Fig. 8

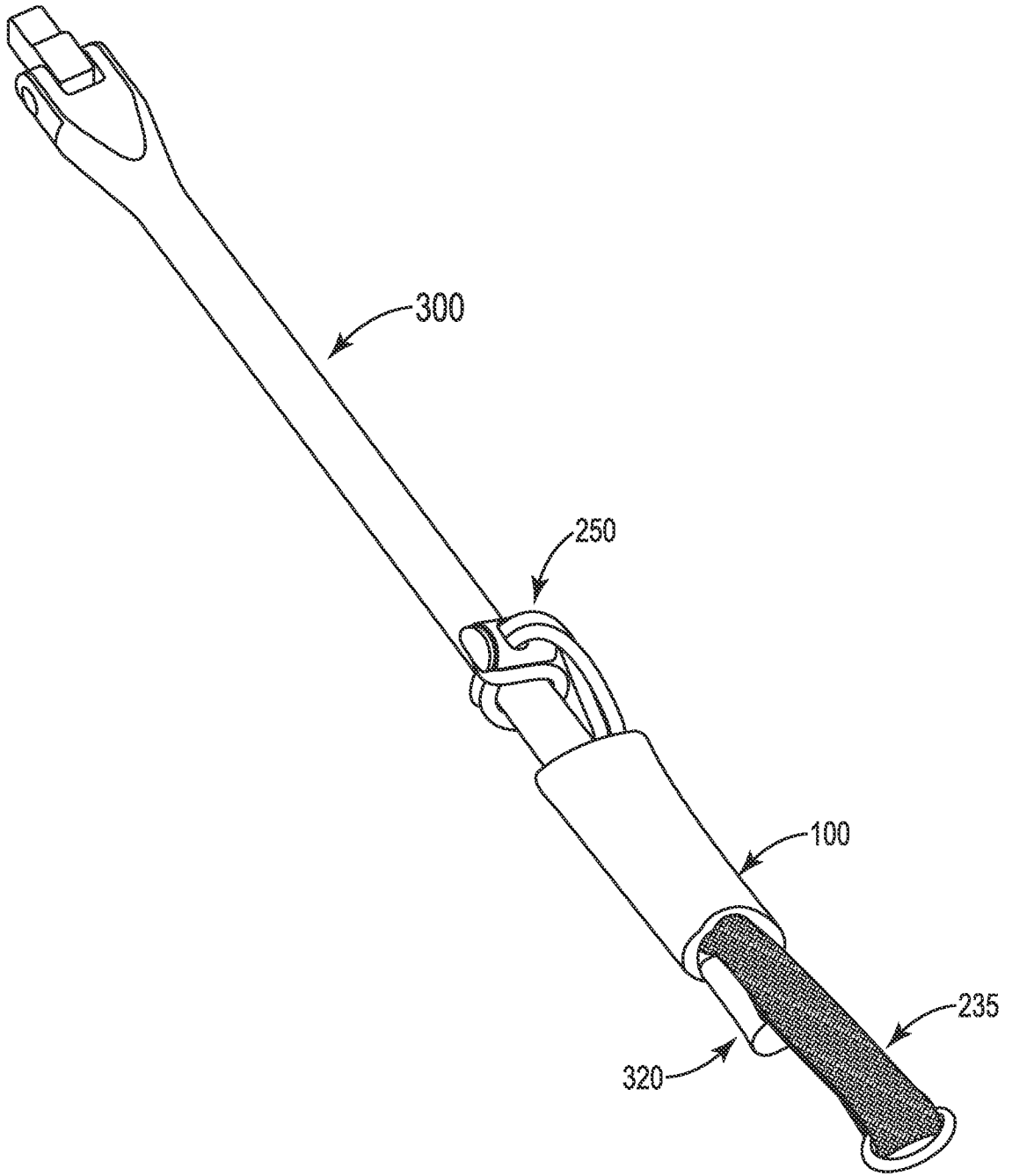


Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 2014/010258

A. CLASSIFICATION OF SUBJECT MATTER		<i>A45F 5/00 (2006.01)</i> <i>B25C 7/00 (2006.01)</i>
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
A45F 5/00, 5/02, 5/14, 3/00, 3/14, A45C 11/00, 11/24, B25C 7/00, B25H 3/00		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
PAJ, Espacenet, DEPATISnet, RUPAT, RUABU1		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2012/0267403 A1 (LEONARD DARNELL WARD, JR) 25.10.2012, abstract, fig. 1-6, paragraphs [0019] - [0024]	1-13
A	US 5082156 A (THOMAS D. BRAUN) 21.01.1992, abstract, fig. 1	1-13
A	CH 672236 A5 (MARKUS TRUMPY ZURICH) 15.11.1989, abstract, fig. 1-3	1-13
A	US 2005/0283952 A1 (WILLIAM TALBOT et al.) 29.12.2005, abstract, fig. 3	1-13
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
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"A"	document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search		Date of mailing of the international search report
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