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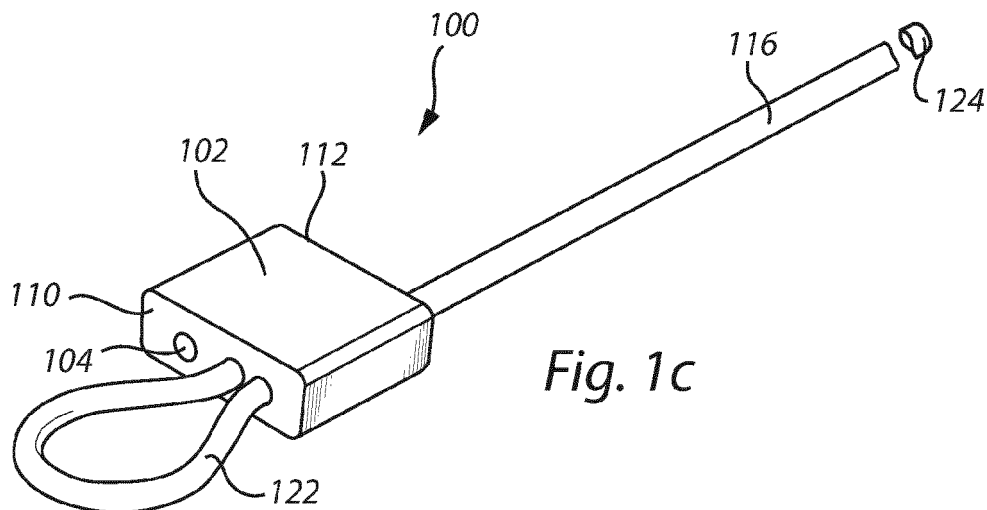
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(54) **Tool connecting device and method for fixing such device to a tool**

(57) A tool connecting device (100), comprising a housing (102) which comprises a first channel (104); a connecting portion (122) connected to said housing (102) at a location spaced apart from said first channel (104);

and a wire (116) connected to said housing (102) at a location spaced apart from said first channel (104), wherein the wire (116) has a free end portion (124) adapted to be fitted through said first channel (104).



Description

Field of the Invention

[0001] The present invention relates to the field of tools, and more specifically to a connecting device arranged to be fitted on a tool. The invention also relates to a method for fixating the device to the tool.

Background of the Invention

[0002] When working at a building construction site, production site or the like, it is important to securely attach the tools that are being used or is to be used, such that they do not accidentally fall to the ground. This may be important when, for example, working at a high altitude, or relatively high altitude, such as the roof of a building, a bridge construction site, or at locations where an accidental drop of a tool might cause injury to persons passing the construction site or production site, etc. The tools may be attached to the body of the person using them, or to a surrounding object, such as a fence, wire, rail, etc. It may also be an important aspect to provide a securement arrangement connected to the tool which is not interfering with the person using it, i.e. the person using the tool should not be prevented from performing his/her job smoothly and efficient due to the securement arrangement.

[0003] EP 2 322 697 discloses a hook for electric power tools, arranged to prevent the electric power tool from accidentally falling to the ground. The hook includes a slip-off preventing portion, a hook body and a joint portion. The hook body and the slip-off preventing portion are continuously formed by bending a single piece of wire which is welded or crimped to the joint portion. The joint portion is further configured to be connected to a battery pack attachment portion of the electric power tool by means of a screw. Moreover, in order to securely arrange the electric power tool, the hook body is connected to a carbine hook or the like which in turn is connected to the waist belt of a worker.

[0004] Although the hook in EP 2 322 697 tries to solve the problem of providing a device for preventing a tool from accidentally falling to the ground, it is in need of further improvement.

Summary of the Invention

[0005] The present invention is based on the insight that, contrary to the prior art in which the connecting device is arranged to be fixated to a specific tool by means of an external connecting element such as e.g. a screw, a connecting device may be arranged so that it can be connected to approximately any tool which is in need of being secured. Hereby, an improved flexibility for a person in need of a connecting element for securely connecting the tool to e.g. an external wire, fence, or the like is achieved, since he/she does not have to be concerned

about choosing the proper and correct connecting device for the specific tool to be secured. The invention is also based on the insight that by providing a connecting device which is arranged to be tightly fixated to the tool to be secured, the risk of accidentally dropping the tool to the ground may be further reduced.

[0006] According to a first aspect of the present invention, a tool connecting device is provided. The tool connecting device comprises: a housing comprising a first channel, a connecting portion connected to the housing at a location spaced apart from the first channel, and a wire connected to the housing at a location spaced apart from the first channel, wherein the wire has a free end portion adapted to be fitted through the first channel.

[0007] The wording "channel" should be understood to mean a formation of the housing in which a wire can be fitted. This formation may, for example, be a recess or groove formed on one of the surfaces of the housing, such that the wire when being assembled can be at least partly visually available to the user. The channel may also, for example, be a through-hole formed within the housing, such that the portion of the wire fitted through the through-hole when being assembled is not visually available to the user. The through-hole may thus have an inlet on one side of the housing and an outlet on another side of the housing. The wire should hence extend into a first end of the channel and out from a second end of the channel.

[0008] Furthermore, it should be noted that the channel may be arranged in many different directions in the housing and/or on the surfaces of the housing. For example, the channel may extend from one side of the housing to an oppositely located second side of the housing, or from a first side of the housing to a second side located at a different angle compared to the first side, whereby the channel is thus in a curve-shaped formation.

[0009] An advantage of having a tool connecting device comprising a housing with a first channel and a wire having a free end portion adapted to be fitted through the channel is, for example, that the tool connecting device may be connected to almost any tool, such as a hammer, a screwdriver, a saw, etc. that may be in need of securement in order to prevent the tool from accidentally falling to the ground during use. Hence, the tool connecting device may thus be an essentially universal connecting device and not particularly designating a specific tool. In other words, the tool connecting device is thus tool-independent and can be suited for approximately any tool in need of securement. Furthermore, by providing a free end of the wire, the user may connect or fixate the connecting device to his/her tool in any suitable fashion, which may e.g. depend on the specific tool to be secured. For example, the tool connecting device may be tightly fixated to a hammer or the like in order to provide a sufficiently strong connection, while a connection to a tool having electrical components, such as an electrical screwdriver, which may be fragile with respect to compression forces, may be less tightly fixated. Hereby, a

further flexibility of the tool connecting device is achieved.

[0010] Moreover, the wire may be provided in many different forms, such as a cable, a strap, metallic wire, a chain, etc. It may be an important aspect that the material used in the wire is susceptible for being tensioned, such that the wire can be securely and tightly fixated around a tool to be secured. Such material may, for example, be steel, aluminum, copper, leather, textile, plastic, etc. The invention is hence not limited to a specific type of wire, which can be chosen dependent on, for example, the specific tool to be secured or the choice of material of the tool connecting device that is being used.

[0011] Furthermore, by providing a connecting portion, the tool connecting device may be securely attached to e.g. a carbine hook, a safety cable or the like. The safety cable may in turn be connected to, for example, the user's clothes, a fence, a wire, etc. Moreover, the connecting portion may be formed in a variety of different configurations. For example, the connecting portion may be a male- or female clip connection which is adapted to connected to a corresponding female- or male connection of e.g. the user's safety belt. It may also be in the form of a strap having e.g. a threaded component or the like at its free end which is arranged to be screwed to a corresponding component attached to the user's safety belt or the like. Other configurations are also conceivable, such as a wire-formed connecting element which is in direct or indirect connection to the housing, which will be discussed separately below.

[0012] According to at least one example embodiment, the housing may further comprise a second channel at a location spaced apart from the first channel.

[0013] The second channel may, as described above in relation to the first channel, be a channel in which a wire can be fitted, such as a groove, recess, hole, through-hole, etc. Furthermore, the second channel may extend in a direction parallel or non-parallel to the first channel and have the form of a straight or curve-shaped channel. Still further, the second channel may, in contrary to the various extensions of the first channel, be in the form of a blind bore extending from one side of the housing into a portion of the housing.

[0014] According to at least one example embodiment, the wire may be arranged through the second channel.

[0015] The wire may be arranged through the entire second channel or through a portion of the second channel.

[0016] According to at least one example embodiment, the connecting portion may be formed by the wire.

[0017] An advantage of having the connecting portion formed by the wire is, at least, that a reduction of production cost may be achieved, since there may be no need of an additional connecting portion arranged to the housing. The wire is hence utilized for an additional purpose other than to be fixated to a tool.

[0018] According to at least one example embodiment, the connecting portion may be a loop-like connecting portion. A connecting portion formed in the shape of a loop

or the like may easily be connected to e.g. a carbine hook or the like which in turn may be connected in such a way that the tool is prevented from falling to the ground when being accidentally dropped. Hereby, the tool connecting device can be connected and disconnected to e.g. the user's safety belt in an easy and convenient fashion. The loop-like connecting portion may be connected to the housing by providing the wire through the second channel, then forming a loop outside the housing and thereafter passing the wire into the second channel again before fixating the wire to the housing. The wire may also be passed into a third through-hole to form the loop-like connecting portion, which will be described below.

[0019] According to at least one example embodiment, the housing may have been fixated to the connecting portion and the wire by having been pressed to the connecting portion and the wire.

[0020] Hereby, the connecting portion and the wire may be securely fixated to the housing. However, other fixating alternatives are conceivable, such as welding, crimping, nailing, press-fitting, gluing, embossing, etc. The connecting portion may extend into or on the surface of the housing. Also, the connecting portion may be a separate portion or be formed by the wire, which will be described below. In the case where the connecting portion is formed by the wire, the wire is thus provided through the second channel before the housing is pressed. Moreover, according to an embodiment, the fixation of the housing to the connecting portion and the wire may be provided by plastically deform the housing.

[0021] According to at least one example embodiment, the housing may further comprise a third channel at a location spaced apart from the first channel.

[0022] The third channel may, as described above in relation to the first and second channels, be a channel in which a wire can be fitted, such as a groove, recess, hole, through-hole, etc. Furthermore, the third channel may extend in a direction parallel or non-parallel to the first and/or second channel and have the form of a straight or curve-shaped channel. Still further, the third channel may also be in the form of a blind bore extending from one side of the housing into a portion of the housing.

[0023] According to at least one example embodiment, the connecting portion may further be fixated to the housing at the third channel.

[0024] The fixation of the connecting portion to the housing at the third channel may be executed, as described above, by pressing the housing to the connecting portion. Hence, in the event the third channel is a hole or a through-hole, the housing is thus pressed around the part of the connecting portion located within the hole or through-hole. If the third channel is a recess or groove, the envelope surface of the housing around the part of the connecting portion within the recess or groove is thus pressed against the part of the connecting surface within the recess or groove. However, the connecting portion may also be fixated to the housing at the third channel by e.g. welding, crimping, nailing, press-fitting, gluing,

embossing, etc.

[0025] An advantage of fixating the connecting portion to the third channel is, at least that the above mentioned loop-like connecting portion may be securely connected to the housing. Also, in the exemplary embodiment where the wire is forming the connecting portion, the production method of forming the connecting portion to the housing may be conveniently executed, since the procedure is more or less to arrange the wire through the second channel, then forming a loop outside the housing and thereafter passing the wire into the third channel before fixating the wire to the housing. Hereby, the loop-like connecting portion may be formed which is securely fixated to the housing.

[0026] According to at least one example embodiment, the first, second and third channels may extend in a direction from a first side of the housing to a second side of the housing.

[0027] The first and second sides of the housing may be located oppositely to each other or located at different angles from each other, for example, approximately parallel or perpendicular to each other. Also, the extension of the first, second and third channels may, as described above, be located parallel to each other or at different angles to each other. Moreover, the channel(s) may have a curve-shaped form such that portions of the channels are located parallel to each other while other portions of the channels are located at different angles from each other.

[0028] According to at least one example embodiment, the connecting portion may be located at the first side of the housing.

[0029] According to at least one example embodiment, the wire may extend in a direction from the second side of the housing.

[0030] In the event the wire extends from the second side of the housing and the connecting portion is located at the first side of the housing, the wire and the connecting portion are thus located at different sides of the housing. Hereby, they are separated from each other and are not in the way of each other. Also, as the wire may be configured to be connected around a tool, the connecting device may be positioned such that it can be conveniently connected to e.g. the user's safety belt or the like, without interfering with the tool.

[0031] According to at least one example embodiment, the wire may in an assembled configuration be tensioned around a tool and fixated to the housing at the first channel.

[0032] An advantage is, at least, that the tool connecting device may be securely and tightly fitted around the tool to be secured. Also, the pre-tensioning of the wire around the tool may preferably be executed before the wire is fixated to the housing at the first channel. The pre-tensioning of the wire may e.g. be executed by the use of a wire tensioner or the like, in order to controllably tension the wire. Hereby, the wire tensioner may control the amount of tensioning in the wire, which may vary

depending on the specific tool to be secured. Also, the tensioning of the wire by use of hand power without a tool may not be sufficient, whereby a wire tensioner may be convenient to use, although the use of hand power is a conceivable alternative.

[0033] Furthermore, the fixation of the wire to the housing at the first channel may be executed by e.g. pressing the housing to the wire. The pressing may, for example, be executed by providing an embossment in the housing at the area around the first channel. Moreover, the fixation may be executed by the above mentioned wire tensioner or by other suitable tools. Other alternatives for fixating the wire to the first channel are of course conceivable, such as e.g. welding, crimping, nailing, press-fitting, gluing, etc. Hence, the fixation of the wire to the first channel may in many ways be compared to the fixation of the connecting portion to the housing at the third channel as described above.

[0034] According to a second aspect of the present invention, a method for fixating a connecting device to a tool is provided. The connecting device comprises a housing comprising a first channel, and a wire connected to the housing at a location spaced apart from the first channel, wherein the wire has a free end portion, the method comprising the steps of: providing the wire around the tool and passing the free end portion through the first channel of the housing, pre-tensioning the wire around the tool, and fixating the wire to the housing at the first channel.

[0035] Advantages of this second aspect are largely analogous to those described in relation to the first aspect, i.e. that the connecting device may be securely, and in an easy fashion, connected to the tool to be secured. Also, the method may be executed by the user which makes it possible for him/her to decide which tools that is in need of being secured. However, the method may also be executed at the tool manufacturing site, such that the tools are provided to the users with the connecting device connected thereto.

[0036] According to at least one example embodiment, the step of fixating the wire to the housing may be executed by providing an embossment in the housing. Other alternatives are of course also conceivable and are described above in relation to the first aspect.

[0037] Other effects and features of this second aspect are largely analogous to those described above in relation to the first aspect of the present invention.

Brief Description of the Drawings

[0038] The above, as well as additional objects, features and advantages of the present invention, will be better understood through the following illustrative and non-limiting detailed description of an exemplary embodiment of the present invention, with reference to the appended drawings, where the same reference numerals will be used for similar elements, wherein:

Figs. 1a - 1c illustrate perspective views of an example embodiment of the tool connecting device according to the present invention;

Figs. 2a - 2b illustrate perspective views of the example embodiment in Figs. 1a - 1c when being fixated to a tool;

Figs. 3a - 3b illustrate perspective views in more detail of the example embodiment of Figs. 2a - 2c where the wire is fixated to the housing of the tool connecting device;

Figs. 4a - 4b illustrate perspective views of an example embodiment of a wire tensioner;

Figs. 5a - 5b illustrates perspective views of the example embodiment of Figs. 4a - 4b when fixating the tool connecting device by using the wire tensioner;

Fig. 6 illustrates a cross-sectional view of the housing according to an example embodiment of the present invention;

Figs. 7 - 9 illustrate further example embodiments of the tool connecting device according to the present invention; and

Fig. 10 illustrates a further example embodiment of a wire tensioner.

Detailed Description of Exemplary Embodiments of the Invention

[0039] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which an exemplary embodiment of the invention is shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiment set forth herein; rather, this embodiment is provided for thoroughness and completeness. Like reference character refer to like elements throughout the description.

[0040] In the following description, the present invention is described with reference to a tool connecting device 100 arranged to be fixated to a tool 202. Firstly, a detailed description will be provided for an example embodiment of the tool connecting device 100 arranged to be fixated to the tool 202. Secondly, a detailed description will be provided for a wire tensioner 400 which, according to an example embodiment, is arranged to tension the wire 116 of the tool connecting device 100.

[0041] Reference is now made in particular to Figs. 1a - 2b illustrating an example embodiment of a tool connecting device 100 which is arranged to be fixated to a tool 202, illustrated in Figs. 2a - 2b as a hammer. Moreover, the tool connecting device 100 comprises a housing 102, here illustrated as having a first 104, second 106 and third 108 channel in the form of through-holes, which are spaced apart from each other. The channels 104, 106, 108 may, however, also be arranged as e.g. recesses or grooves on at least one of the surfaces of the housing 102. Furthermore, the channels 104, 106, 108 extend, in the illustrated example embodiment, in a straight direction from a first side 110 to an oppositely located sec-

ond side 112 of the housing 102. The channels 104, 106, 108 may, however, also be configured to extend in a direction from one of the other sides of the housing 102 to either one of the first 110 and/or second 112 sides. Furthermore, the housing 102 also comprises, in the illustrated example embodiment, a protruding portion 114. This protruding portion 114 of the housing 102 is arranged to be pressed in order to fixate a first wire portion 118 (see Fig. 6) of the wire 116 which will be described in further detail below. The housing 102 may hence be made of a material which is susceptible for such a pressing operation. Example of housing material is thus aluminum, different types of plastic, steel, copper, brass, etc.

[0042] Moreover, as mentioned above, the tool connecting device 100 further comprises a wire 116. The wire has a first 118 and second 120 wire portion, which is best illustrated in Fig. 6, where the first wire portion 118, in the illustrated example embodiment, is arranged to be fixated to the second 106 channel of the housing 102 and the second wire portion 120 is in an assembled configuration arranged to be fixated to the first channel 104 of the housing 102. Moreover, the wire 116 further comprises a free end portion 124 which is configured to be provided around the tool 202 to be secured and thereafter arranged through the first channel 104 of the housing when being assembled, as will be described further below. Furthermore, the wire 116 also extends through the second channel 106, where the first wire portion 118 is fixated, and out from the first side 110 of the housing 102 making a loop and thereafter provided into the third channel 108, thus forming a connecting portion 122. Still further, the protruding portion 114 of the housing 102 is in the illustrated example embodiment, when the wire 116 is arranged through the second 106 and third 108 channels, pressed such that the wire 116 is securely fixated within the channels 106, 108, and the protruding portion 114 is thus approximately aligned with the non-protruding portion, which is clearly illustrated in Fig. 1c, thereby forming an assembled configuration of the tool connecting device 100 before it is fixated to the tool 202. It should however be noted that the wire 116 may be fixated to the second 106 and/or third 108 channels of the housing 102 by other means than being pressed. For example, the wire may be welded, glued, nailed, etc. Also, the entire protruding portion 114 does not necessarily have to be pressed, it may just as well be sufficient to only press a part of the protruding portion 114 in order to obtain a secure fixation of the wire 116. Furthermore, although the drawings illustrate that the first wire portion 118 is fixated in the second channel 106 and the second wire portion 120 is fixated in the first channel 104, variations are conceivable. For instance, the first wire portion 118 may instead be fixated in the third channel 108, which is located between the first channel 104 and the second channel 106.

[0043] Still further, as illustrated in e.g. Figs. 1b - 1c, the tool connecting device 100 comprises the above mentioned connecting portion 122, here illustrated as a

loop-like connecting portion. The connecting portion 122 is arranged to be connected to a suitable safety arrangement (not illustrated), such as a carbine hook, a safety belt, etc. The safety arrangement may in turn be connected or coupled to e.g. the belt of a user, a surrounding fence or rail, etc. in order to securely attach the tool connecting device 100, and hence the tool 202, and to prevent the tool 202 from accidentally being dropped to the ground during work.

[0044] Although the connecting portion 122 is illustrated in the figures as being a part of the wire 116, other alternatives are of course also conceivable. The connecting portion 122 may, for example, be a male- or female clip connection which is adapted to connect to a corresponding female- or male connection of e.g. the user's safety belt or the like. It may also be in the form of a strap having e.g. a threaded component or the like at its free end which is arranged to be screwed to a corresponding component attached to the user's safety belt or the like. In the two last mentioned examples, the connecting portion 122 can, but does not necessarily have to be fixated to the third channel 108 of the housing 102.

[0045] Reference is now made in particular to Figs. 4a - 4b, illustrating partly cross-sectional perspective views of a wire tensioner 400 which is arranged to tension a wire around a tool 202. The wire tensioner 400 is preferably a handheld wire tensioner and is in particular arranged to tension the wire 116 of the above described tool connecting device 100, although the wire tensioner 400 in other configurations and embodiments not illustrated here may be able to tension and fixate e.g. only a wire around a tool without having a housing to be connected to.

[0046] The wire tensioner 400 comprises, in the illustrated example embodiment of Figs. 4a - 4b, a tube shaped casing 401 having an insert portion 402 which comprises an opening 404 located at a front side 406 of the wire tensioner 400 and which is arranged to receive a housing 102 of e.g. a wire-equipped tool connecting device 100. Moreover, the insert portion 402 also comprises a fixating means 420. The fixating means 420 comprises, in the illustrated example embodiment, a threaded screw having its screw head on the exterior of the tube shaped casing 401. The screw head may be susceptible for e.g. an Allen key, a screw driver, or the like. Furthermore, a ball-like portion 422 is arranged at the bottom part of the fixating means 420. The ball-like portion 422 is arranged to hold the housing 102 of the wire-equipped tool connecting device 100 at position within the insert portion 402 and, which will be describe further below, to provide an embossment to the housing 102 such that the second wire portion 120 is fixated to the housing in the first channel 104.

[0047] Furthermore, the wire tensioner 400 also comprises a tensioning means 407. The tensioning means 407 comprises a rod 408, a wire gripping portion 416 and an actuator 412 located at the rear end 414 of the wire tensioner 400. Moreover, the rod 408 comprises external

threads 410 at a rear side thereof which are arranged to mesh with internal threads (not shown) of the actuator 412. Also, the wire gripping portion 416 of the tensioning means 407 is, in the illustrated example embodiment, coupled to the rod 408 by means of a thread connection such that a screw or the like can be provided to a channel 424, here illustrated as a through-hole or bore located within the rod 408. A user of the wire tensioner 400 may thus, in order to tension the wire 116, provide the wire 116 through the channel 424 in the rod 408, grip the wire 116 between the channel 424 and the wire gripping portion 416 by operating a handle 418, located at the exterior of the casing 401, of the wire gripping portion 416 so that the wire 116 is fixated to the rod 408. Thereafter, by executing a screw-like operation to the actuator 412, moving the tensioning means 407 away from the insert portion 402 and hence tension the wire. Although the wire gripping portion 416 is illustrated as a manually operated component, it may just as well be an automated component having electrical components such that a user of the wire tensioner 400 only needs to push a button or the like to grip the wire 116 to the rod 408 of the tensioning means 407.

[0048] The invention will now be described in more detail with reference to a method for tightening the wire 116 of the tool connecting device 100 around a tool to be secured. Reference is in a first stage made to Figs. 2a - 3b illustrating the method without the use of the above described wire tensioner 400. In a second stage, reference will be made mainly to Figs. 4a - 5b, illustrating the method by using the wire tensioner 400.

[0049] According to the example embodiment illustrated in Fig 1 c and described above, the tool connecting device 100 comprises a first wire portion 118 (visible in Fig. 6) fixated to the second channel 106 of the housing 102. The wire 116 extends from a second side 112 of the housing 102 and has a free end portion 124. When the tool connecting device 100 is to be fixated to the tool 202, the housing 102 of the tool connecting device 100 may preferably be positioned adjacent the tool 202, or more specifically, adjacent the handle 204 of the tool 202 which it is to be fixated to, such that the second side 112 of the housing 102 is approximately facing the handle 204 of the tool 202, as can be seen in e.g. Fig. 2a. The free end portion 124 of the wire 116 is thereafter arranged around the handle 204 of the tool 202 and into the first channel 104 at the second side 112 of the housing 102, thus forming a wire loop 206 around the handle 204 of the tool 202. When the wire is arranged around the handle 204 of the tool 202 and through the first channel 104 of the housing 102, the wire is tensioned and tightened such that the wire loop 206 and the second side 112 of the housing 102 is in abutment against the handle 204 of the tool 202, which is best illustrated in Fig. 2b. The material of the wire may vary depending on various parameters such as the amount of tension in the wire, the tool 202 to be provided with the tool connecting device, etc. It may hence be an aspect that the wire material is susceptible

for being tensioned. Such material may, for example, be steel, aluminum, copper, leather, textile, plastic etc.

[0050] Furthermore, with reference to Figs. 3a and 3b, when the wire is tightly fixated around the handle 204 of the tool 202, the second wire portion 120 (visible in Fig. 6) which is positioned in the first channel 104 of the housing 102 is fixated to the housing 102 so that the tool connecting device 100 is kept in a tightened position to the tool 202. The fixation of the housing 102 to the wire 116 is, in the illustrated example embodiment, executed by providing an embossment 208 on the surface of the housing 102 where the first channel 104 is located. The fixation of the wire 116 to the housing 102 may however be executed in a number of ways, such as welding, nailing, crimping, etc. Finally, when the tool connecting device 100 and more specifically, the wire 116 of the tool connecting device 100 has been tightened around the tool 202, the free end portion 124 of the wire which now extends out from the first side 110 of the housing 102 may be cut off. This can be executed by any suitable tool depending on e.g. the specific wire material.

[0051] Now, in order to describe the tensioning of the wire 116 by use of the above described wire tensioner 400, reference is in particular made to Figs. 4a - 5b. When tensioning the wire around the tool 202, the first wire portion 118 is fixated to the second channel 106 of the housing 102 as described above. Thereafter, the housing 102 and the e.g. loop-like connecting portion 122 is positioned within the insert portion 402 of the housing 102, i.e. the first side 110 of the housing 102 is facing the wire tensioner 400 before arranging the housing 102 into the insert portion 402. Furthermore, the housing 102 is connected to the insert portion 402 in such a way that it is more or less fixated to the insert portion 402. This may be executed by, for example, a clip- or snap connection such that the housing 102 is e.g. snapped into the insert portion 402 to securely hold the housing 102 in position. It may also, as illustrated in the example embodiment of e.g. Fig. 4b, be executed by tightening the screw of the fixating means 420 onto the surface of the housing 102 to such an amount that the housing 102 is held in position without being deformed.

[0052] Moreover, the free end portion 124 of the wire 116 is thereafter provided around the tool 202 to be secured in a similar manner as the above described procedure in relation to Figs. 2a and 2b. The free end portion 124 of the wire 116 is hence arranged around the tool 202 and thereafter returned, according to the example embodiment, through the first channel 104 of the housing 102 which is also provided in the insert portion 402 of the wire tensioner 400. The free end portion 124 of the wire 116 is further provided through the insert portion 402 and into the rod 408 of the tensioning means 407, or more specifically, into the channel 424 located, in the illustrated example embodiment, within the rod 408 of the tensioning means 407. When the wire 116 has been provided into the wire tensioner 400 to a sufficient amount, the wire gripping portion 418 is, by means of a screw con-

nection, fixating the wire 116 to rod 408 in the channel 424. The screw connection of the wire gripping portion 418 is hence tightened on a portion of the wire 116 which in turn abuts on a counteracting portion of the channel 424 to fixate the wire 116 to the rod 408. In the illustrated embodiment of e.g. Figs. 4a - 5b the wire is, when provided through the rod 408, adapted to be provided out from the rod 408, via the channel 424, at the rear end 414 of the wire tensioner 400. However, the wire may just as well be provided out from the rod 408 and through the casing 401 at a position located after the wire gripping portion 418. In such a case, the channel 424 may thus be formed in a curve-shape such that the wire is led out at the surface of the casing 401.

[0053] Furthermore, when the tool connecting device 100 has been assembled in the wire tensioner 400 as described above, and best seen in Fig. 5a, the wire 116 is tensioned and tightened around the tool 202. This may be accomplished, according to the example embodiment illustrated in Fig. 5a and 5b, by providing a rotary movement to the actuator 412 of the tensioning means 407 such that a translation movement is provided to the rod 408. Hereby, the wire gripping portion 418 is moved away from the insert portion 402 where the first wire portion 118 is fixated. The wire 116 is hence tightened around the tool 202 as illustrated in Fig. 5b. Thereafter, by tightening the screw of the fixating means 420, the ball-like portion 422 arranged at the bottom part of the fixating means 420 provides an embossment 208 in the housing so that the tightened second wire portion 120 is fixated to the first channel 104 of the housing 102. However, as also described above, the fixation of the second wire portion 120 to the first channel 104 of the housing 102 may in another example embodiment also be provided by e.g. welding, nailing, crimping, etc.

[0054] Finally, when the embossment 208 is provided to the housing 102, the wire tensioner 400 can be removed, i.e. the wire gripping portion 418 is released from the wire 116 and the housing 102 is removed from the insert portion 402, thereby providing the tool connecting device 100 in the configuration as illustrated in Fig. 3a. The wire may then be cut off as described above and illustrated in Fig. 3b.

[0055] Reference is now made to Figs. 7 - 9 illustrating further example embodiments of the tool connecting device according to the present invention. In Fig. 7 the housing 702 of the tool connecting device is arranged in a lying position in comparison with the housing 102 described in relation to e.g. Figs. 1a - 1c. Also, the wire 116 is, contrary to e.g. Figs. 1a - 1c, extending from a first side 704 of the housing 702, around the tool 202 to be secured, and into the housing 702 at the second side 706 of the housing. Also, the embossment 708 for fixating the wire to the housing is provided differently compared to the embossment in the housing illustrated in e.g. Figs. 3a - 3b.

[0056] The housing in Fig. 8 is, as for the embodiment illustrated in Fig. 7, positioned in a lying configuration.

The main difference between the embodiment depicted in Fig. 8 and the previously described embodiments is that the connecting portion 822 is arranged by the wire and extending in a direction from the first side 804 of the housing 802 to the second side 806 of the housing 802.

[0057] Finally, the embodiment depicted in Fig. 9 comprises a housing 902 having two channels, here illustrated as through-holes. Also, the connecting portion 922 is formed by the wire and having an element 904 for holding the connecting portion in position located at an approximately opposite side of the tool 202 compared to the housing 902 of the tool connecting device. Hereby, the connecting portion 922 is in indirect connection to the housing 902. The element 904 may also be a strap, weld or other suitable attachment means for holding the connecting portion 922 in position. Still further, the connecting portion does not necessarily have to be formed by the same wire as fixated around the tool, the connecting portion 922 may just as well be a separate wire fixated to the element.

[0058] Reference is now made to Fig. 10 which illustrates a further embodiment of the wire tensioner 1000. The differences between the wire tensioner 1000 in Fig. 10 and the wire tensioner 400 illustrated in e.g. Figs. 4a - 4b is mainly focused to the insert portion 1002 and the fixating means 1020. As is illustrated in Fig. 10, the fixating means 1020 is positioned on the side of the insert portion 1002 instead of on the top as illustrated in e.g. Figs 4a - 4b. Also, the insert portion 1002 is provided with a generally plane surface 1010 which is arranged to, when the wire is to be fixated around a tool, "rest" against the tool to be secured with the tool connecting device. Also, the opening, to which the housing of the tool connecting device is provided, may have an opened configuration at the generally plane surface 1010, so that the wire which is to be provided around the tool to be secured can be provided out from the insert portion 1002. Furthermore, the exemplary embodiment depicted in Fig. 10 may be suitable, but not limited, to use for the exemplary embodiments of the tool connecting devices illustrated in Figs. 7 and 8.

[0059] Although one example embodiment of the present invention have been described herein, it should be apparent to those having ordinary skill in the art that a number of changes, modifications or alterations to the invention as described herein may be made. For example, the housing of the tool connecting device does not necessarily have to comprise three channels, two channels may also be sufficient, whereby the loop-like connecting portion is fixated only to one channel instead of two. Also, the wire gripping portion may instead of a screw connection be configured with one or more balls. The channel of the rod may thus be in a tapered form, so that when the rod is moved away from the insert portion, the ball(s) are gripped between the tapered channel and the wire so that the wire is securely gripped to the rod. Furthermore, the rod may be provided as a gear rack which is arranged to mesh with a gear wheel forming the actu-

ator, instead of the above described threaded components. According to another embodiment, the tensioning means may also be provided as a hydraulic piston which is arranged to move the rod away from the insert portion when tensioning the wire.

[0060] Still further, although the tool connecting device is illustrated as being fixated to a hammer, it is readily understood that the tool connecting device is configured to be fixated to approximately any tool in need of being secured. The tool connecting device should hence be considered as a tool-independent device.

[0061] Thus, the above description of the example embodiment of the present invention and the accompanying drawings are to be regarded as a non-limiting example of the invention and the scope of protection is defined by the appended claims. Any reference sign in the claims should not be construed as limiting the scope.

Claims

1. A tool connecting device (100), comprising:

a housing (102) comprising a first channel (104);
a connecting portion (122) connected to said housing (102) at a location spaced apart from said first channel (104); and
a wire (116) connected to said housing (102) at a location spaced apart from said first channel (104), wherein the wire (116) has a free end portion (124) adapted to be fitted through said first channel (104).

2. A device as claimed in claim 1, wherein said housing (102) further comprises a second channel (106) at a location spaced apart from said first channel (104).

3. A device as claimed in claim 2, wherein said wire (116) is arranged through said second channel (106).

4. A device as claimed in any one of the preceding claims, wherein said connecting portion (122) is formed by said wire (116).

5. A device as claimed in any one of the preceding claims, wherein said connecting portion (122) is a loop-like connecting portion.

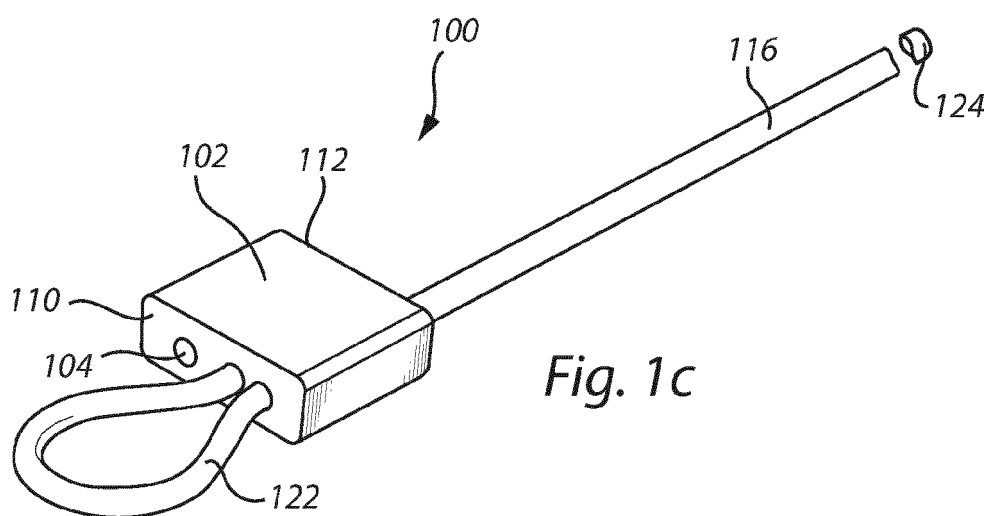
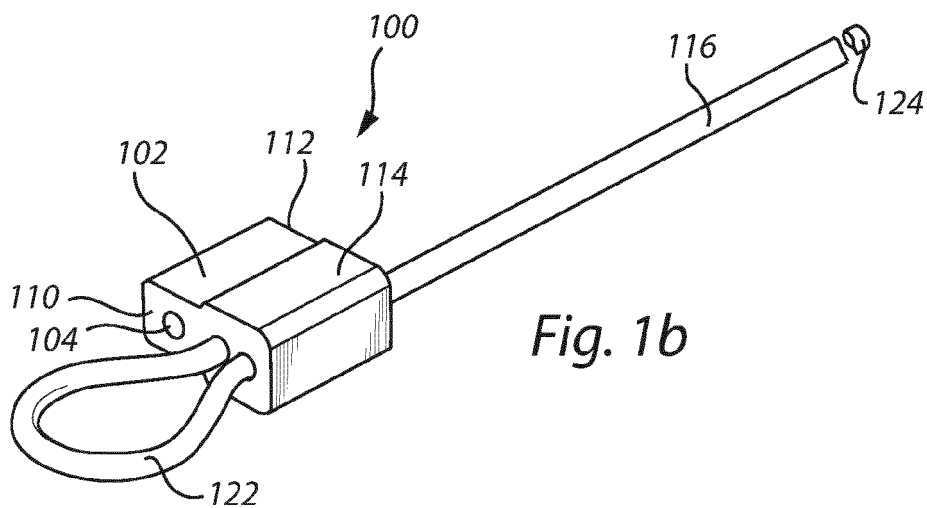
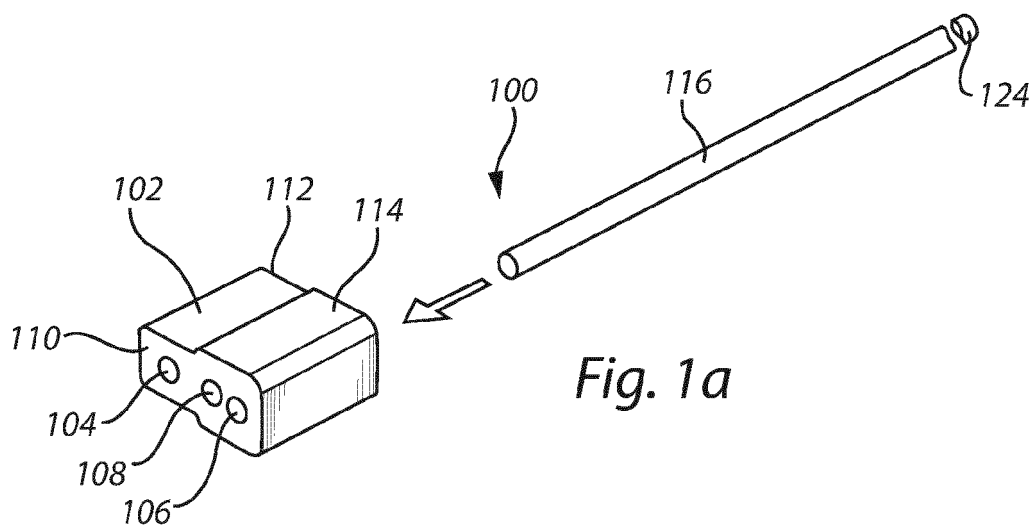
6. A device as claimed in any one of the preceding claims, wherein said housing (102) has been fixated to said connecting portion (122) and said wire (116) by having been pressed to said connecting portion (122) and said wire (116).

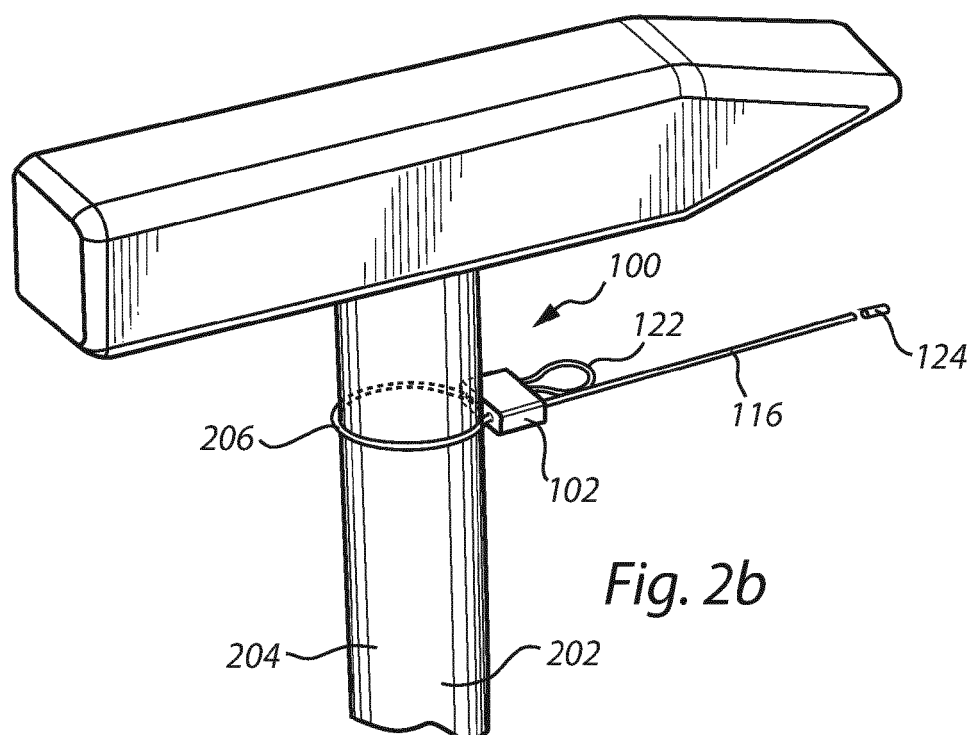
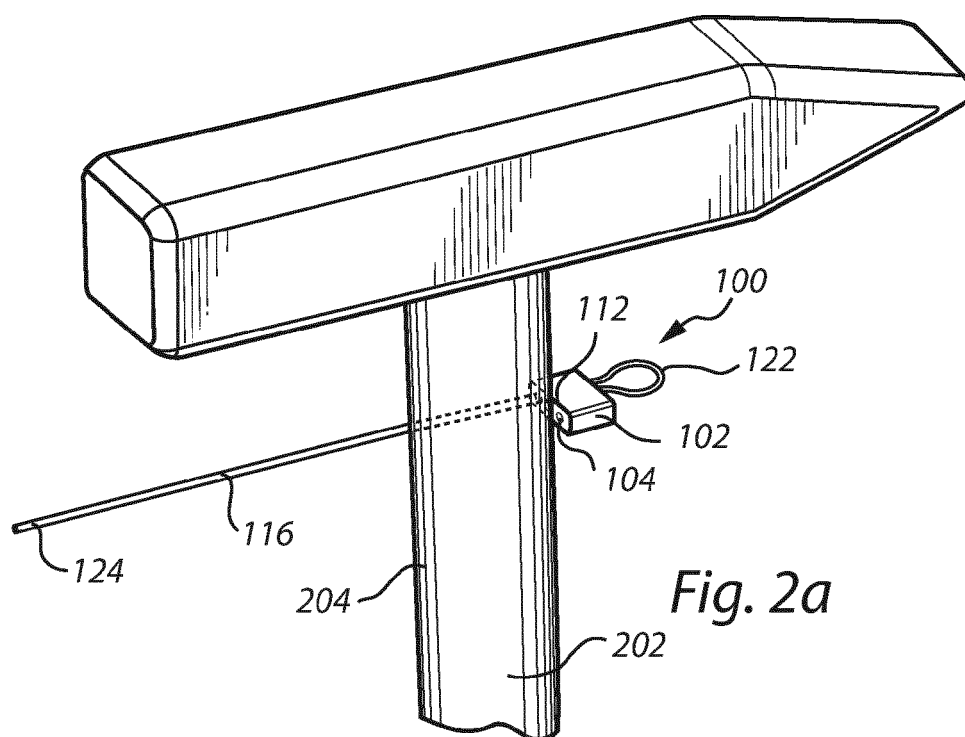
7. A device as claimed in any one of the preceding claims, wherein said housing (102) further comprises a third channel (108) at a location spaced apart

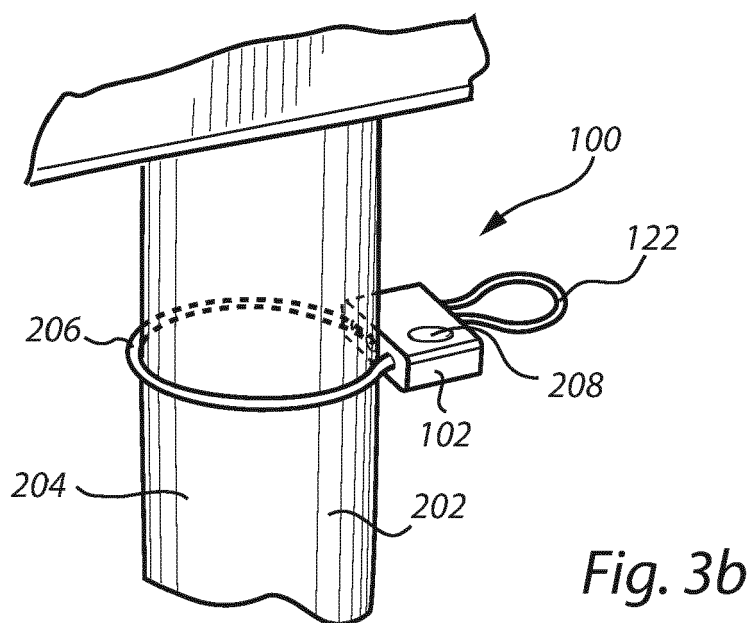
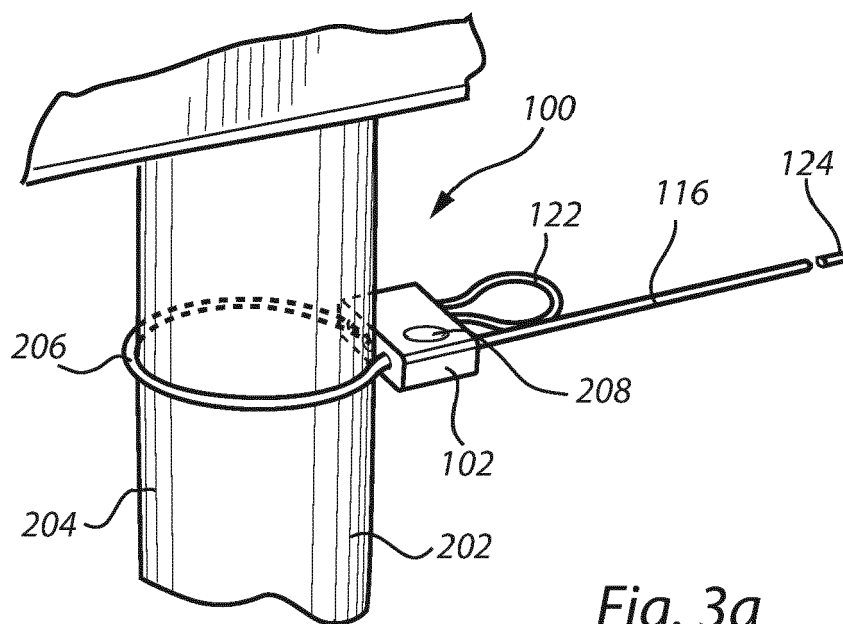
from said first channel (104).

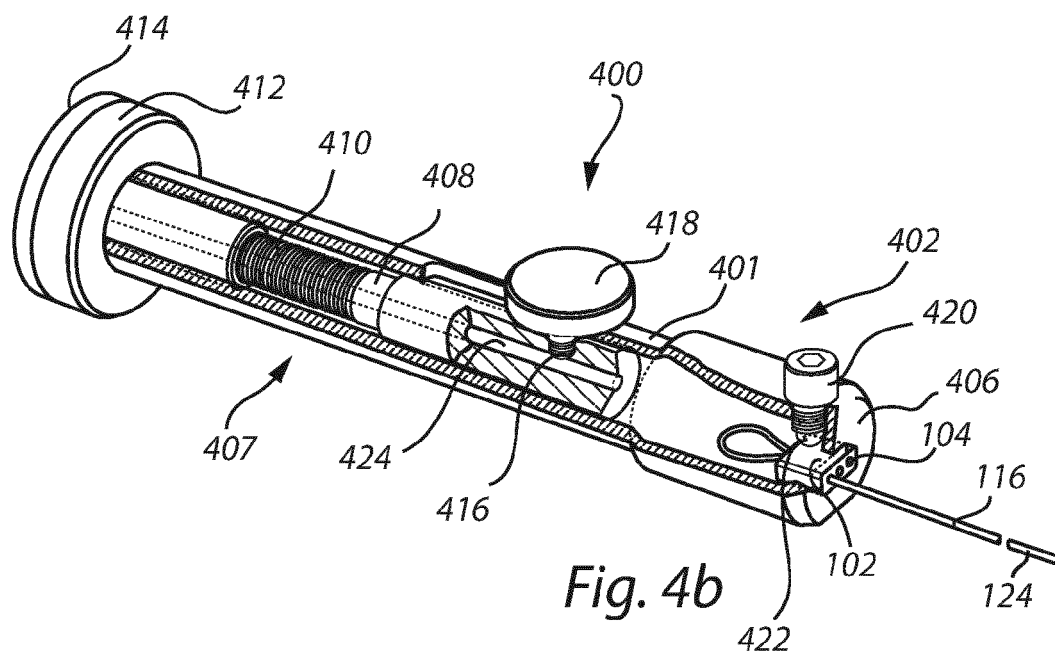
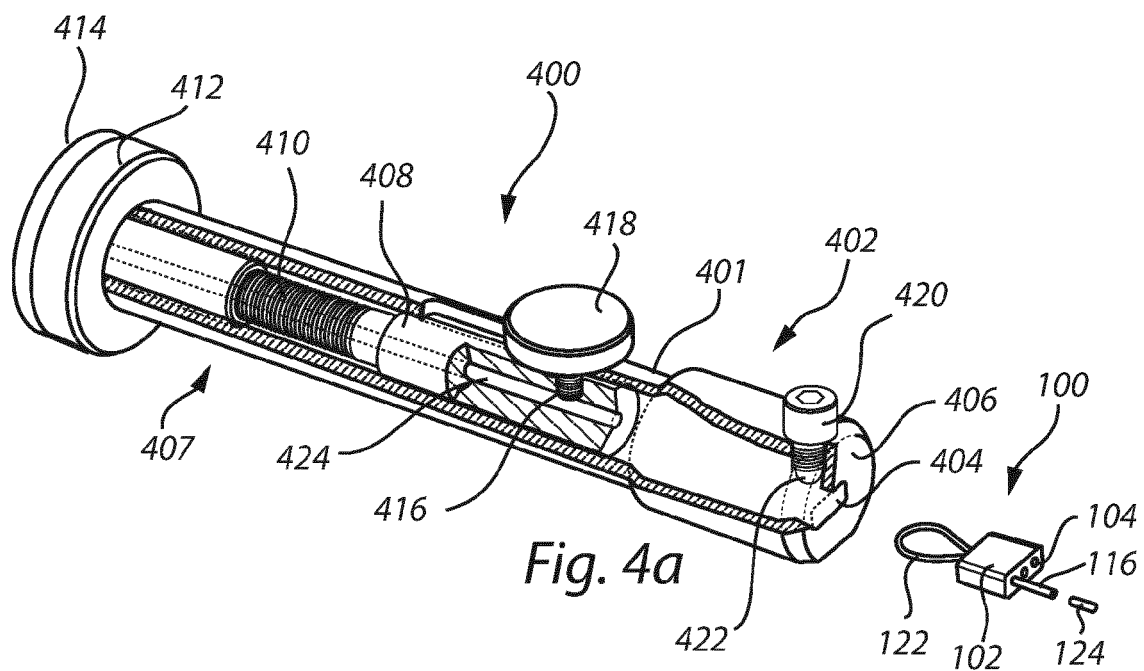
8. A device as claimed in claim 7, wherein said connecting portion (122) is further fixated to the housing (102) at said third channel (108). 5
9. A device as claimed in any one of claims 7 - 8 when dependent on claim 2, wherein said first (104), second (106) and third (108) channels extend in a direction from a first side (110) of said housing (102) to a second side (112) of said housing (102). 10
10. A device as claimed in any one of the preceding claims, wherein said connecting portion (122) is located at said first side (110) of said housing (102). 15
11. A device as claimed in any one of the preceding claims, wherein said wire (116) extends in a direction from said second side (112) of said housing (102). 20
12. A device as claimed in any of the preceding claims, wherein said wire (116) in an assembled configuration is tensioned around a tool (202) and fixated to the housing (102) at said first channel (104). 25
13. A method for fixating a connecting device (100) to a tool (202), wherein the connecting device (100) comprises a housing (102) comprising a first channel (104), and a wire (116) connected to said housing (102) at a location spaced apart from said first channel (104), wherein the wire (116) has a free end portion (124), the method comprising the steps of: 30
 - providing said wire (116) around said tool (202) and passing said free end portion (124) through said first channel (104) of said housing (102); 35
 - tensioning said wire (116) around said tool (202); and
 - fixating said wire (116) to said housing (102) at said first channel (104). 40
14. A method as claimed in claim 13, wherein the step of fixating said wire (116) to said housing (102) is executed by providing an embossment (208) in said housing (102). 45
15. A method as claimed in claim 13 or 14, wherein said connecting device (100) is the connecting device as claimed in any one of claims 1 - 12. 50

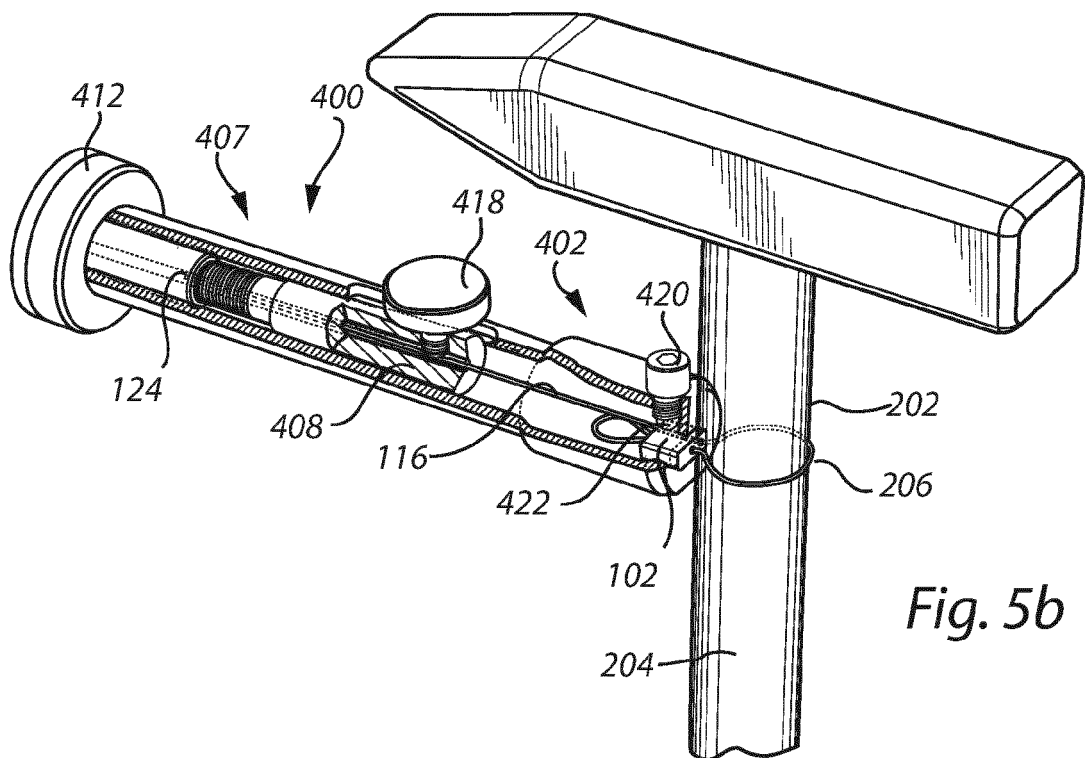
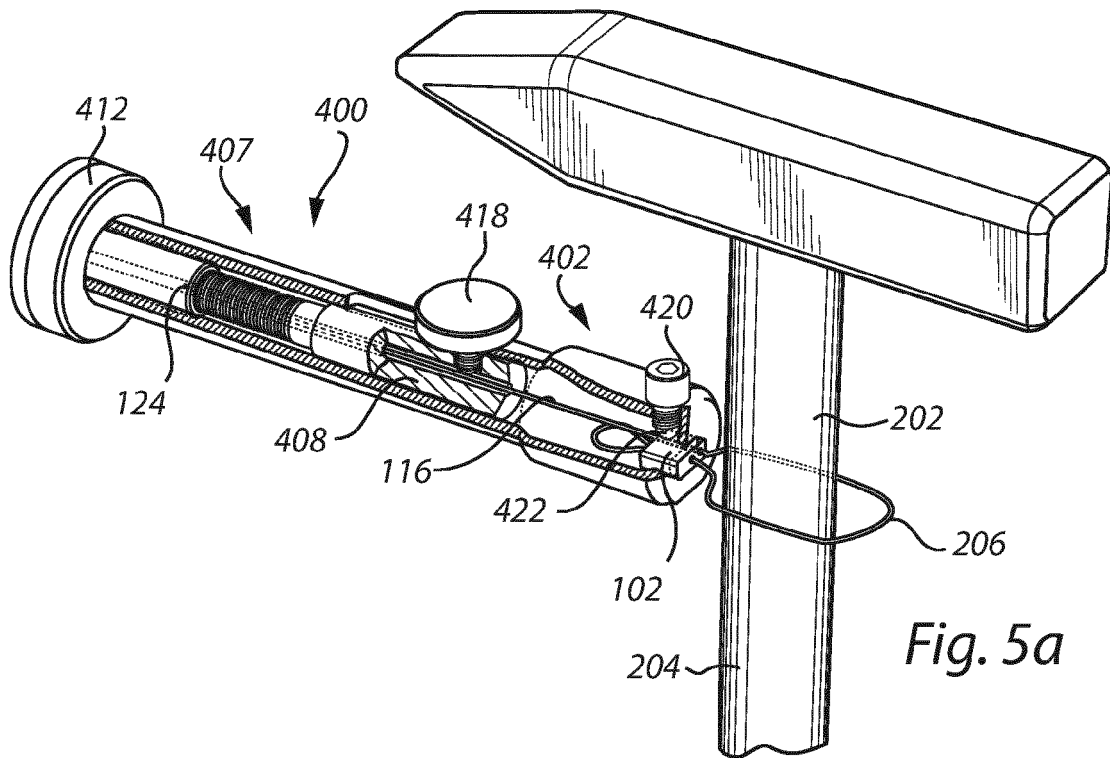
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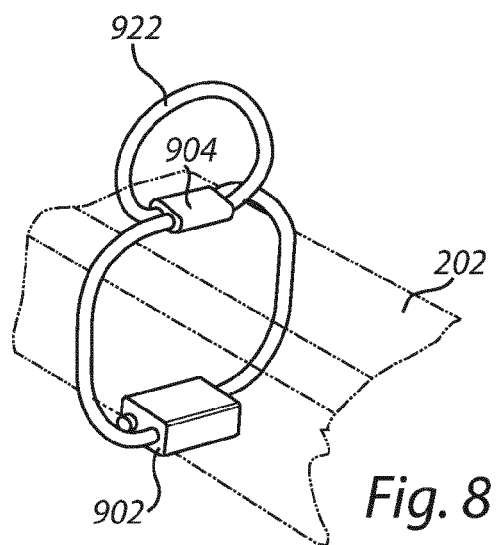
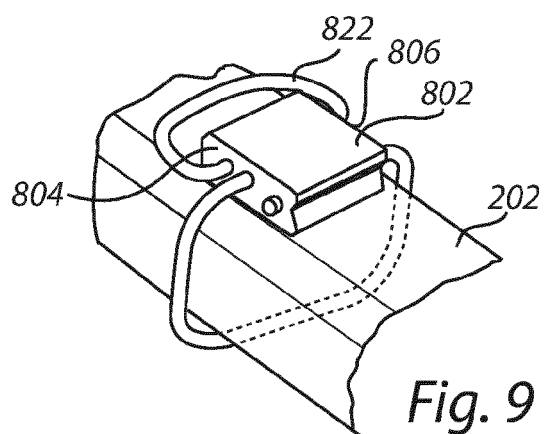
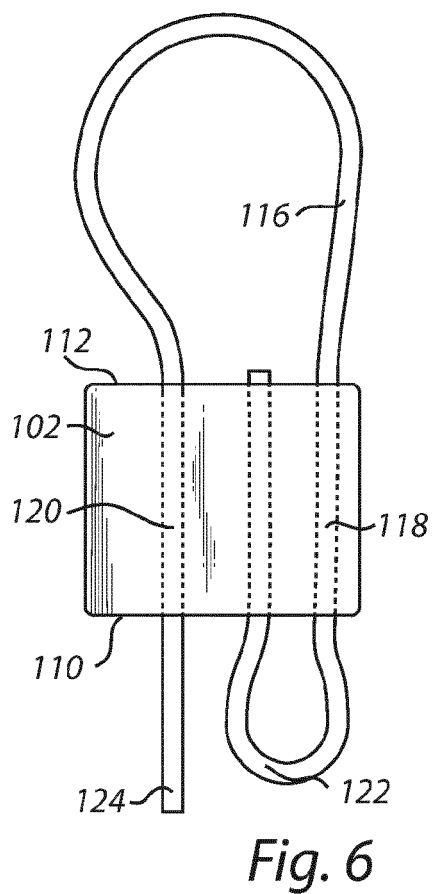
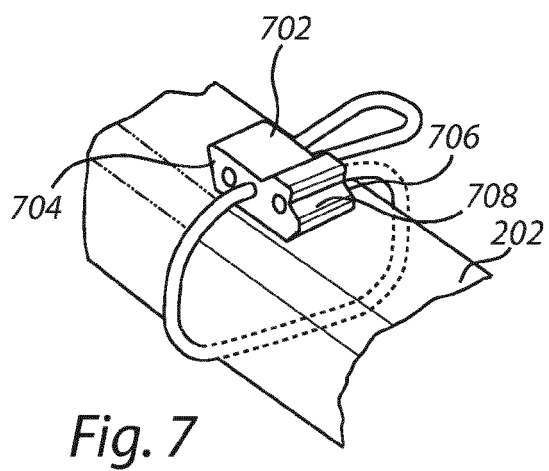












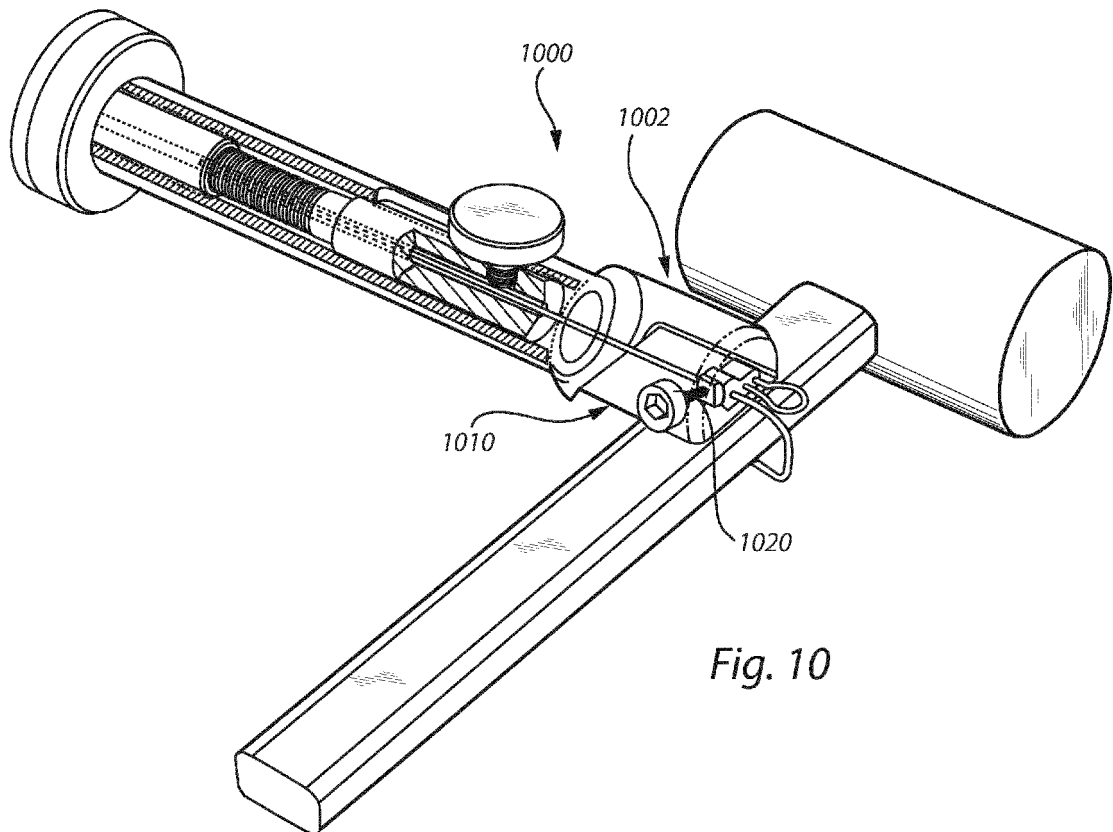


Fig. 10



EUROPEAN SEARCH REPORT

 Application Number
EP 11 19 5769

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Place of search The Hague		Date of completion of the search 11 June 2012	Examiner Gerard, Olivier
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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