Title: A screw-type fastener a device for gripping a screw-type fastener ✓1

Field of invention:

The present invention relates to screw-type fasteners and devices for gripping screw-type fasteners, methods of using screw-type fasteners and devices, and kits comprising screw-type fasteners and devices. ✓1

Background:

Fasteners are commonly used, in both domestic and industrial applications, as method of securing one object to another, among many other uses. A very well-known type of fastener is the screw. Examples of different types of screw 10, 20 and 30 are shown in figures 1a-1d. The head of the screw generally includes a formation 11, 21, 31 on its top surface which accommodates the tip of a screwdriver. Some screws, such as those shown in figures 1c-1d may also include wings 32 which a user may hold and twist the screw. These wings limit the places in which a screw may be used, as the wings must be accessible and not clash with other screws or surrounding objects. Screwdrivers 40, 50, as shown in figure 2, are similarly well-known, and generally include a handle 41, 51, a shaft 42, 52 and a tip 43, 53. Screwdriver tips are designed to cooperate with the formation provided on the head of the screw, and once in engagement, the user may twist the screwdriver to tighten or loosen the screw. Screwdrivers are available with different tip configurations, and are selected by the user to correspond to the engaging formation of the screw to be used. In use, as the user rotates the screw, the tip may slip out of the formation. ✓1

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According to a first aspect of the invention, there is provided a screw-type fastener comprising a head configured to protrude above a surface to which the screw-type fastener is to be screwed into, the head comprising a formation configured to engage with the tip of a screwdriver, a shank, of which at least a portion is helically threaded, the head portion further comprising a recess provided on the side of the head, the recess partially extending into the head in a direction towards the shank. The provision of an additional recess which is separate to the engaging formation which receives the tip of a screw enables the user of the screw to insert a tool into the recess. As the recess is provided on the side of the head, the tool is accordingly inserted so that it points in a direction which is substantially perpendicular to the axis about which the screw is required to twist. This means that a tool held within the recess will, upon twisting of the screw, be forced against a side of the recess. When used in conjunction with a screwdriver, this increases the grip that the user is able to apply to the screw, to make twisting easier. Additionally, if the tool is connected to the screwdriver, it will aid in preventing the screwdriver tip from slipping out of the engaging formation on the head of the screw. In addition to this, a tool could be used without a screwdriver, whilst still enabling the user to twist the screw with just the tool inserted into the recess. ✓1

In embodiments, the opening of the recess may be substantially rectangular. A substantially rectangular shape ensures that most tools of appropriate size should be able to fit inside the recess and a portion of the tool will be able to contact at least a portion of the side of the recess.

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In embodiments, the volume inside the recess may be substantially cuboid in shape. Such a configuration ensures that a tool which cooperates with the rectangular opening of the recess is able to be fully inserted into the recess.

In embodiments, there may be at least two recesses provided on the head. This enables the user to use multiple tools to twist the screw – whether used with or without a screwdriver. This serves to increase the torque that a user can apply to the screw.

In embodiments , there may be four recesses provided on the head. The use of four recesses enables four tools to be used to twist the screw – whether used with or without a screw driver. Again, the user is able to apply more torque to twist the screw, and is provided with a choice of recesses into which to place a tool, just in case other recesses are obstructed.

In embodiments, the recesses may be equally spaced around the head. Placing the recesses at equal distances about the perimeter of the screw head ensures that, when all recesses are used, torque is equally distributed about the head. This improves the balance and, if a screwdriver is being used, reduces the chance of a screwdriver tip slipping out of the engaging formation. ✓1

According to a second aspect of the invention, there is provided a device for gripping a screw-type fastener comprising an elongate collar having a central axis, the elongate collar adapted to receive a screwdriver shaft, a moveable engagement arm connected to the elongate collar, wherein, a protrusion is provided on an end of the moveable engagement arm part remote from the elongate collar, the protrusion extending substantially towards the central axis of the elongate collar, and a fixing means which, in use, fixes the position of the

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protrusion relative to the elongate collar. As this device is able to receive a screwdriver, the moveable engagement arm is able to be positioned in a desired location relative to the tip of the screwdriver. When used to grip a screw-type fastener according to the first aspect of the invention, the user is able to insert the protrusion into the recess on the side of the head of the screw. Then, using the fixing means, the user can fix the protrusion within the recess. ✓½
Advantageously, the user is then able to twist the device so that the protrusion grips the screw head whilst simultaneously twisting the screwdriver. This increases the grip the user can apply to the screw, and helps to prevent the screwdriver tip from slipping out of the engaging formation on the screw.

In embodiments, the moveable engagement arm may comprise a first arm part connected to the collar, a second arm part connected to the first arm part and, the second arm part being moveable relative to the first arm part, and wherein the protrusion is provided on the second arm part. This increases the range of available movement of the moveable engagement arm, and the protrusion, relative to the collar. ✓½

In embodiments , the first arm part may be pivotally connected to the elongate collar, and the second arm part may be pivotally connected to the first arm part at an end remote from the protrusion. Pivotal movement such as this enables parts of the arm, and the attached protrusion to be moved away and towards the collar ✓½
as desired by a user.

In embodiments, the fixing means may comprise a wire, in which, a first end cooperates with the second arm part, an intermediate portion cooperates with the first arm part; and a second end cooperates with a ratcheting means provided on

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the collar. The provision of a wire and a ratcheting means enables a user to manipulate the parts of the engagement arm into a desired orientation, and then lock them into place using the ratcheting means.

In embodiments, the ratcheting means may configurable between a first state in which the wire is secured in place, and a second state in which the wire may pass through the ratcheting means. This enables the user to readjust the orientation and position of the arm as needed.

In embodiments, the second arm part may be slidably moveable relative to the first arm part. Slidable movement enables the second arm part to be moved in a straight line towards and away from the first arm part. ✓½

In embodiments, the first arm part may be fixed relative to the elongate collar. This enables the second arm part to be moved in a straight line towards and away from the collar.

In embodiments, the fixing means may comprise a tension spring connected at a first end to the second arm part, and connected at a second end to the elongate collar, and which, in use, the tension spring urges the second arm part towards the elongate collar. The urging of the second arm part towards the elongate collar means that the protrusion on the end of the arm part is also urged upwards. When placed in the recess of the screw according to the first aspect of the invention, this ensure the protrusion stays within the recess and will not slip out of it.

In embodiments, the moveable engagement arm may include a user-graspable handle. The handle allows the user to easily manipulate the moveable

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engagement arm in a convenient way, and so that they may keep their hands away from a screwdriver tip when using the device.

In embodiments, the elongate collar may include a securing means configured to secure a screwdriver shaft relative to the collar. This ensures that the screwdriver does not slip relative to the collar, and thus the protrusion which is fixed relative to the collar.

In embodiments, the securing means is configured to enable adjustment of the position of the screwdriver shaft relative to the collar. This allows the user to reposition the screwdriver during use, to ensure it is in the correct place relative to the screw. ✓½

In embodiments, the device may comprise at least two moveable engagement arms. Multiple engagement arms means that the user can grip a screw-type fastener in multiple locations about the head of the screw, improving grip and providing additional centring of a screwdriver relative to the screw.

In embodiments, the device may comprise four equally spaced moveable engagement arms. Four equally spaced arms improves the centring of the device and a screwdriver relative to the head of the screw, and distributes torque evenly about the screw head.

In embodiments, the device may further comprise means to secure the moveable engagement arms together such that, in use, manipulation of one arm effects simultaneous manipulation of the other arm(s). This makes the device easier to use when multiple arms are present. ✓½

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According to a third aspect of the invention, there is provided a method of tightening a screw-type fastener according to a first aspect of the invention using a device according to a second aspect of the invention, the method comprising, providing a screwdriver within the elongate collar of the device, locating the shank of the screw-type fastener on the surface to which the fastener is to be screwed into, placing the tip of the screwdriver into the engaging formation on the head of the fastener, at least partially inserting the protrusion provided on the moveable engagement arm into the recess on the head of the fastener, fixing the position of the protrusion relative to the collar using the fixing means provided on the device, twisting the device in a rotational direction corresponding to the rotational direction required to tighten the fastener. This method enables a user to improve the grip they have on the screw head by placing a protrusion into the recess, and to prevent the tip of the screwdriver from slipping out of the engaging formation provided on the head.

According to a fourth aspect of the invention, there is provided a kit comprising a device for gripping a screw-type fastener according to a second aspect of the invention and a screwdriver.

According to a fifth aspect of the invention, there is provided a kit comprising a screw-type fastener according to a first aspect of the invention, and a device for gripping a screw-type fastener according to a second aspect of the invention,.

In embodiments, the kit may further comprise a screwdriver.

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

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Figure 1a is a side view of a fastener according to the prior art;

Figure 1b is a perspective view of another fastener according to the prior art;

Figure 1c is a plan view of another fastener according to the prior art;

Figure 1d is a side view of the fastener shown in figure 1c;

Figure 2 is a perspective view of two types of screwdriver according to the prior art;

Figure 3a is a perspective view of a screw-type fastener according to an embodiment of the present invention;

Figure 3b is a plan view of the screw-type fastener shown in figure 3a;

Figure 4 is a side view of a device for gripping a screw-type fastener according to an embodiment of the present invention;

Figure 5 is a side view of a device for gripping a screw-type fastener according to another embodiment of the present invention. ✓2

A screw-type fastener 100 (hereinafter, screw 100) is shown in figures 3a-3b. The screw 100 includes a head 110, a shank 120 which extends away from the head 110, and an engaging formation 130 provided on a top surface 110a of the head. The shank 120 includes a helically threaded portion 121, which in use is to be driven into the surface or substrate to which the screw is to be applied. The threaded portion 121 of the shank, in use grips the material of the surface or substrate. The head 110 of the screw 100, in use, is designed to sit proud of the surface or substrate to which a screw 100 is to be tightened with respect to. The bottom surface 110b of the screw 100, once the screw is tightened, sits upon the

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surface or substrate, and if tightened sufficiently will impart a pressure on the surface or substrate due to the threaded portion 121 of the shank 120 gripping the material.

To tighten the screw 100, it must be twisted about the shank 120. To do this, an appropriate screwdriver is placed into the engaging formation 130, and the user rotates the screwdriver and screw 100 in a direction which causes it to be tightened. This direction is dependent on whether the helical portion runs clockwise or counter-clockwise.

The head 110 of the screw 100 also includes four recesses 150a-d. For conciseness, only one recces 150 will be described in detail. The recess 150 is provided on a side 110c of the screw, and is provided separately (in other words, in addition to) the engaging formation 130 on the head 110. The recess 150 has an opening 152, which as shown in figure 3a is substantially rectangular in shape. The recess 150 partially extends into the head 110 of the screw 100 in a direction towards the shank 120, and thus extends generally parallel to a surface or substrate to which the screw 100 is to be applied. The recess 150 extends in a generally uniform manner partially through the head 110 of the screw 100, and thus the internal volume 154 of the recess 150 is substantially cuboid in shape. The skilled person would contemplate that recesses 150 having alternative shaped openings 152 and volumes 154 are also possible, without departing from the present invention.

Each of these recesses 150a-d are identical in their configuration, though the skilled person would understand that they may differ in configuration without departing from the present invention.

Though not shown in the figures, skilled person would contemplate that the screw 100 may include less than four recesses 150a-d, for instance, two or three.

In use, the recesses 150a-d enable a user to partially insert a tool, device or any appropriate object into the volume 154 of the recess 150. This enables a user to use the tool to twist the screw 100 in a desired direction. The user can perform this task whilst simultaneously using a screwdriver.

An embodiment of a device 200 for gripping a screw-type fastener is shown in figure 4. The device includes an elongate collar 210 having a central axis 212. The elongate collar 210 is adapted to receive a screwdriver shaft 2000, and includes a channel 214 which extends generally in the direction of central axis 212 into which the screwdriver is insertable. The device 200 also includes a moveable arm engagement arm 220 connected to the elongate collar. In the embodiment shown, the moveable engagement arm 220 comprises a first arm part 222 connected to the collar 210, a second arm part 224 connected to the first arm part 222. The second arm part 224 is moveable relative to the first arm 222 part by a pivot connection 226. A protrusion 230 is provided on the second arm part 224, at an end which is remote from the elongate collar 210. The protrusion 230 extends in a direction substantially towards the central axis A of the elongate collar 210.

The device 200 includes a fixing means which is used to fix the position of the protrusion 230 relative to the elongate collar 210. The fixing means comprises a wire 240, in which a first end 240a cooperates with the second arm part 224, an intermediate portion 240b cooperates with the first arm part 222 and a second end 240c cooperates with a ratcheting means 250 provided on the collar 210. The ratcheting means 250 is configurable between a first state in which the wire 240 is secured in place relative to the collar 210, and a second state in which the wire 240 may pass through the ratcheting means 250. The user is able to manipulate the arm 220, or pull on the wire 240, so that the wire passes through the ratcheting means 250 until the arm is in the desired position, and then the user can configure the ratcheting means 250 to secure the wire 240, and ultimately the arm 220, in place.

The moveable engagement arm 220 further includes a user-graspable handle 260, which is provided, in this embodiment, on the first arm part 222. This allows the user to effect movement of the arm 220 without directly touching the arm parts 222, 224.

The elongate collar 210 additionally includes a securing means configured to secure a screwdriver shaft relative to the collar 210. The securing means is configured to enable adjustment of the position of the screwdriver shaft relative to the collar, and in this embodiment is a securing screw 270 which is rotatable relative to the collar 210.

Though not shown in the figures, it is possible for the device 200 two include comprise at least two moveable engagement arms 220, with four equally spaced moveable engagement arms 220 being a desirable configuration. The device, when multiple arms are present, further comprises means to secure the moveable engagement arms 220 together such that, in use, manipulation of one arm 220 effects simultaneous manipulation of the other arm(s) 220.

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The device 200 is to be used in conjunction with a screw 100. To tighten a screw 100 using the device, the user first inserts and secures a screwdriver within the elongate collar 210 of the device 200. The user then locates the shank 120 of the screw 100 on the surface or substrate to which the screw 100 is to be screwed into. The user places the tip of the screwdriver into the engaging formation 130 on the head 110 of the screw. The user then at least partially inserts the protrusion 230 provided on the moveable engagement arm 220 into the recess 150 on the head 110 of the screw 100. The user then fixes the position of the protrusion 230 relative to the collar 210 using the fixing means provided on the device 210. The user then twists the device 200 in a rotational direction corresponding to the rotational direction required to tighten the screw 100. The use of the fixing means ensures that the protrusion 230 is held in place relative to the screwdriver, and the grip of the protrusion 230 in the recess 150 prevents movement of the screwdriver relative to the formation 130.

In an alternative embodiment of the device 300, shown in figure 5, the second arm part 324 of the moveable engagement arm 320 is slidably moveable relative to the first arm part 322. The first arm part 322 is fixed relative to the elongate collar 310. In this embodiment, the fixing means comprises a tension spring 350 connected at a first end 350a to the second arm part 324, and is connected at a second end 350b to the elongate collar 310. In use, the tension spring 350 urges the second arm part 324, and the protrusion 330, towards the elongate collar 310.

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Intro + Des

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<u>Claims:</u>

What is claimed:

1. A screw-type fastener comprising:

a head configured to protrude above a surface to which the screw-type fastener is to be screwed into, the head comprising a formation configured to engage with the tip of a screwdriver;

a shank, of which at least a portion is helically threaded;

the head portion further comprising a recess provided on the side of the head, the recess partially extending into the head in a direction towards the shank. ✓6

2. A screw-type fastener according to any preceding claim, wherein the opening of the recess is substantially rectangular.

3. A screw-type fastener according to any preceding claim, wherein the volume inside the recess is substantially cuboid in shape.

4. A screw-type fastener according to any preceding claim, wherein there are at least two recesses.

5. A screw-type fastener according to any preceding claim, wherein there are four recesses. ✓½

6. A screw-type fastener according to any preceding claim, wherein the recesses are equally spaced around the head. ✓1

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7. A device for gripping a screw-type fastener comprising:

an elongate collar having a central axis, the elongate collar adapted to receive a screwdriver shaft;

a moveable arm engagement arm connected to the elongate collar, wherein;

a protrusion is provided on an end of the moveable engagement arm part remote from the elongate collar; the protrusion extending substantially towards the central axis of the elongate collar; and

a fixing means which, in use, fixes the position of the protrusion relative to the elongate collar. ✓10

8. A device according to claim 7, wherein the moveable engagement arm comprises a first arm part connected to the collar, a second arm part connected to the first arm part and, the second arm part being moveable relative to the first arm part, and wherein the protrusion is provided on the second arm part. ✓1½

9. A device according to claim 8, wherein the first arm part is pivotally connected to the elongate collar, and the second arm part is pivotally connected to the first arm part at an end remote from the protrusion. ✓1

10. A device according to claim 9, wherein the fixing means comprises a wire, in which:

a first end cooperates with the second arm part;

an intermediate portion cooperates with the first arm part; and

a second end cooperates with a ratcheting means provided on the collar. ✓1

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11. A device according to claim 10, wherein the ratcheting means is configurable between a first state in which the wire is secured in place, and a second state in which the wire may pass through the ratcheting means.

12. A device according to claim 8, wherein the second arm part is slidably moveable relative to the first arm part. ✓½

13. A device according to claim 12, wherein the first arm part is fixed relative to the elongate collar. ✓½

14. A device according to claim 12 or claim 13, wherein the fixing means comprises a tension spring connected at a first end to the second arm part, and connected at a second end to the elongate collar, and which, in use, the tension spring urges the second arm part towards the elongate collar. ✓2

15. A device according to any one of claims 7 to 14, wherein the moveable engagement arm further includes a user-graspable handle. ✓½

16. A device according to any one of claims 7 to 15, wherein the elongate collar include a securing means configured to secure a screwdriver shaft relative to the collar. ✓½

17. A device according to claim 16, wherein the securing means is configured to enable adjustment of the position of the screwdriver shaft relative to the collar.

18. A device according to any one of claims 7 to 17, comprising at least two moveable engagement arms.

19. A device according to any one of claims 7 to 18, comprising four equally spaced moveable engagement arms.

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20. A device according to claim 18 or claim 19, further comprising means to secure the moveable engagement arms together such that, in use, manipulation of one arm effects simultaneous manipulation of the other arm(s). ✓1

21. A method of tightening a screw-type fastener according to any one of claims 1 to 6 using a device according to any one of claims 7 to 20, the method comprising:

providing a screwdriver within the elongate collar of the device;

locating the shank of the screw-type fastener on the surface to which the fastener is to be screwed into;

placing the tip of the screwdriver into the engaging formation on the head of the fastener;

at least partially inserting the protrusion provided on the moveable engagement arm into the recess on the head of the fastener;

fixing the position of the protrusion relative to the collar using the fixing means provided on the device;

twisting the device in a rotational direction corresponding to the rotational direction required to tighten the fastener.

22. A kit comprising a device for gripping a screw-type fastener according to any of claims 7 to 20 and a screwdriver. ✓2

23. A kit comprising a screw-type fastener according to any one of claims 1-6 and a device for gripping a screw-type fastener according to any of claims 7 to 20. ✓3

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24. A kit according to claim 23 further comprising a screwdriver. ✓1

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Claims 31

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Abstract

Title: A screw-type fastener and a device for gripping a screw-type fastener ✓½

There is provided a screw-type fastener 100 having a head 110 configured to protrude above a surface to which the screw-type fastener is to be screwed into, the head 110 comprising a formation 130 configured to engage with the head of a screwdriver, a shank 120, of which at least a portion is threaded, the head 110 further comprising a recess 150 provided on the side of the head 110c, the recess 150 partially extending into the head 110 in a direction towards the shank 120. The screw-type fastener 100 is used fasten one object to another object. There is also provided a device 200 for gripping a screw-type fastener which ✓2½ assists in the tightening of a screw-type fastener.

✓½

Figure 3a

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Abstract 3½

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Figures

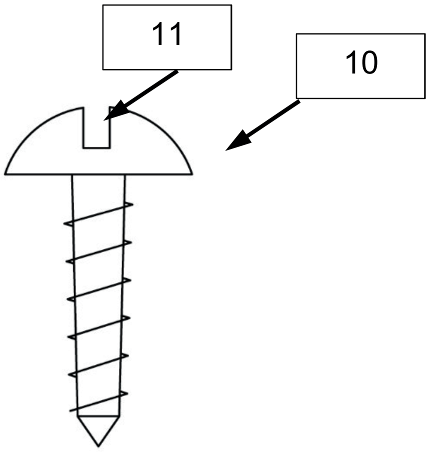

Figure 1a

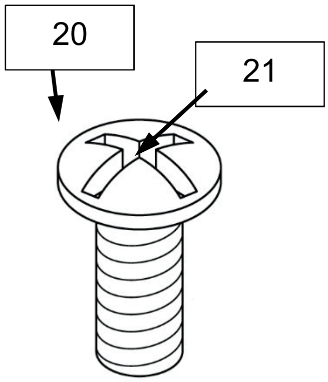

Figure 1b

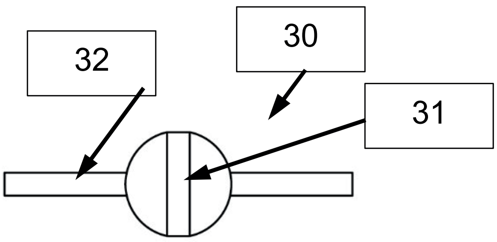

Figure 1c

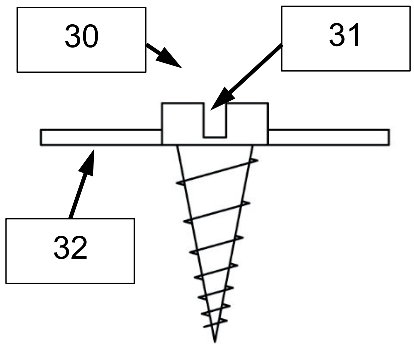

Figure 1d

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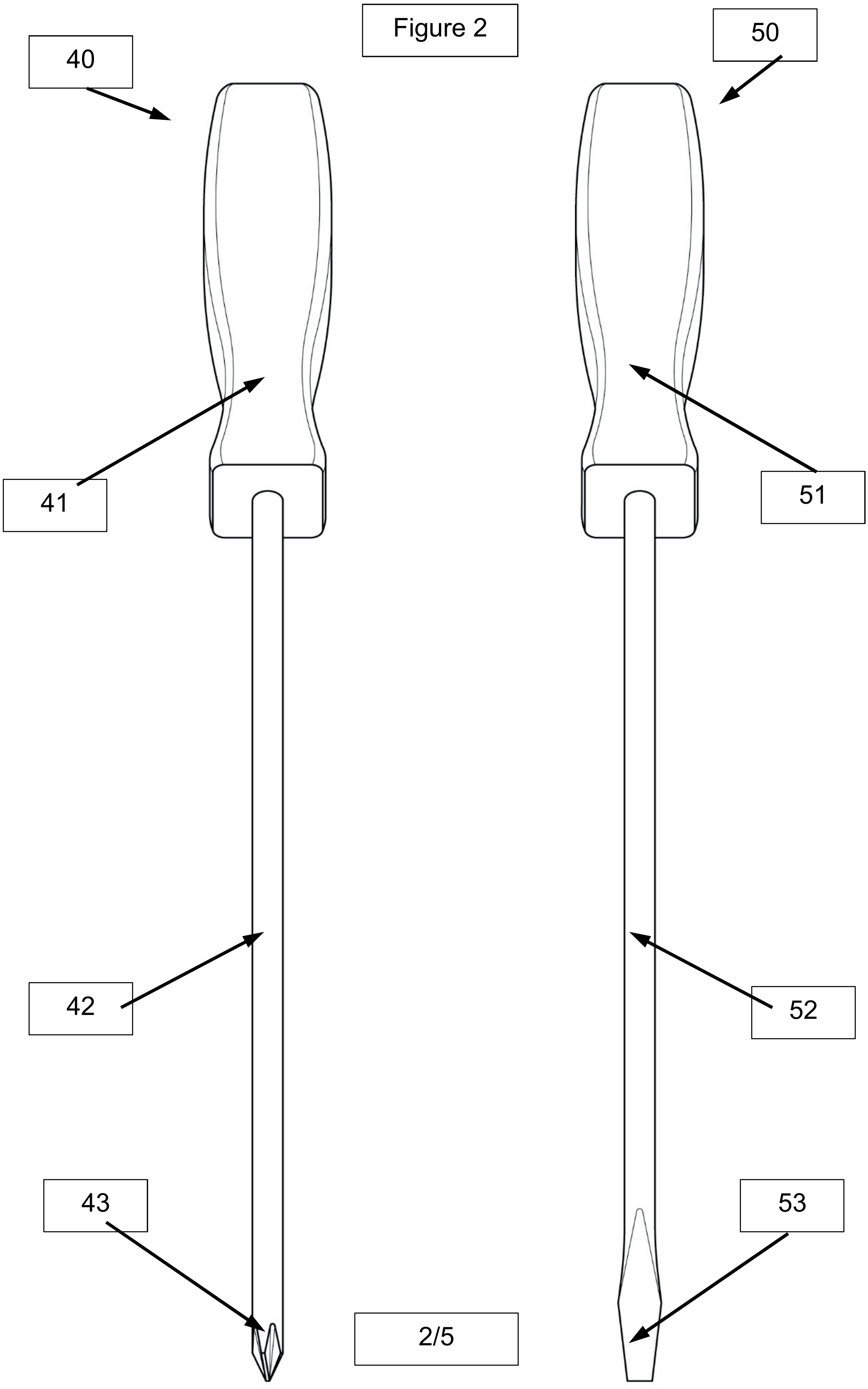
Figure 2



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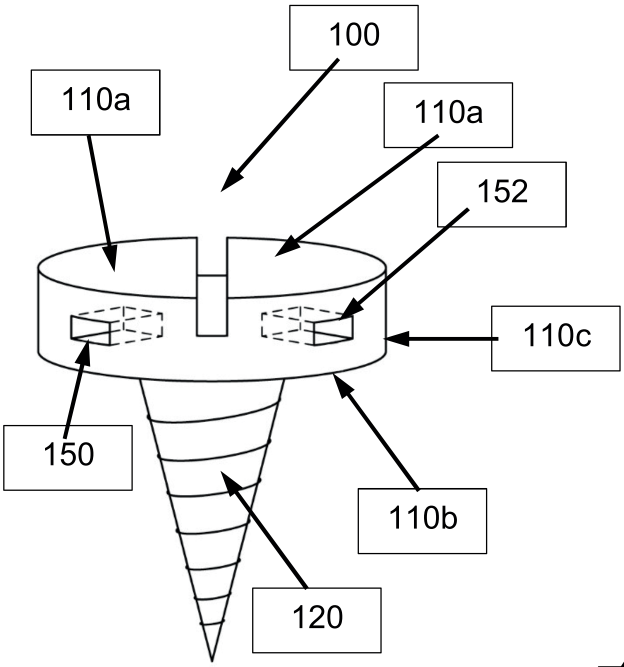

Figure 3a

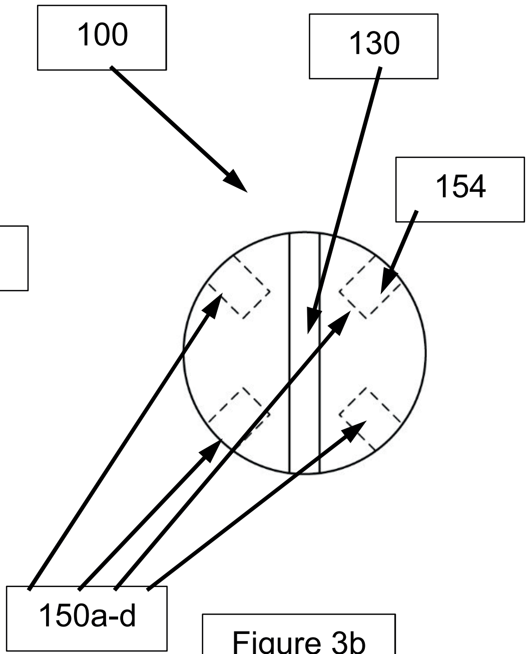

Figure 3b

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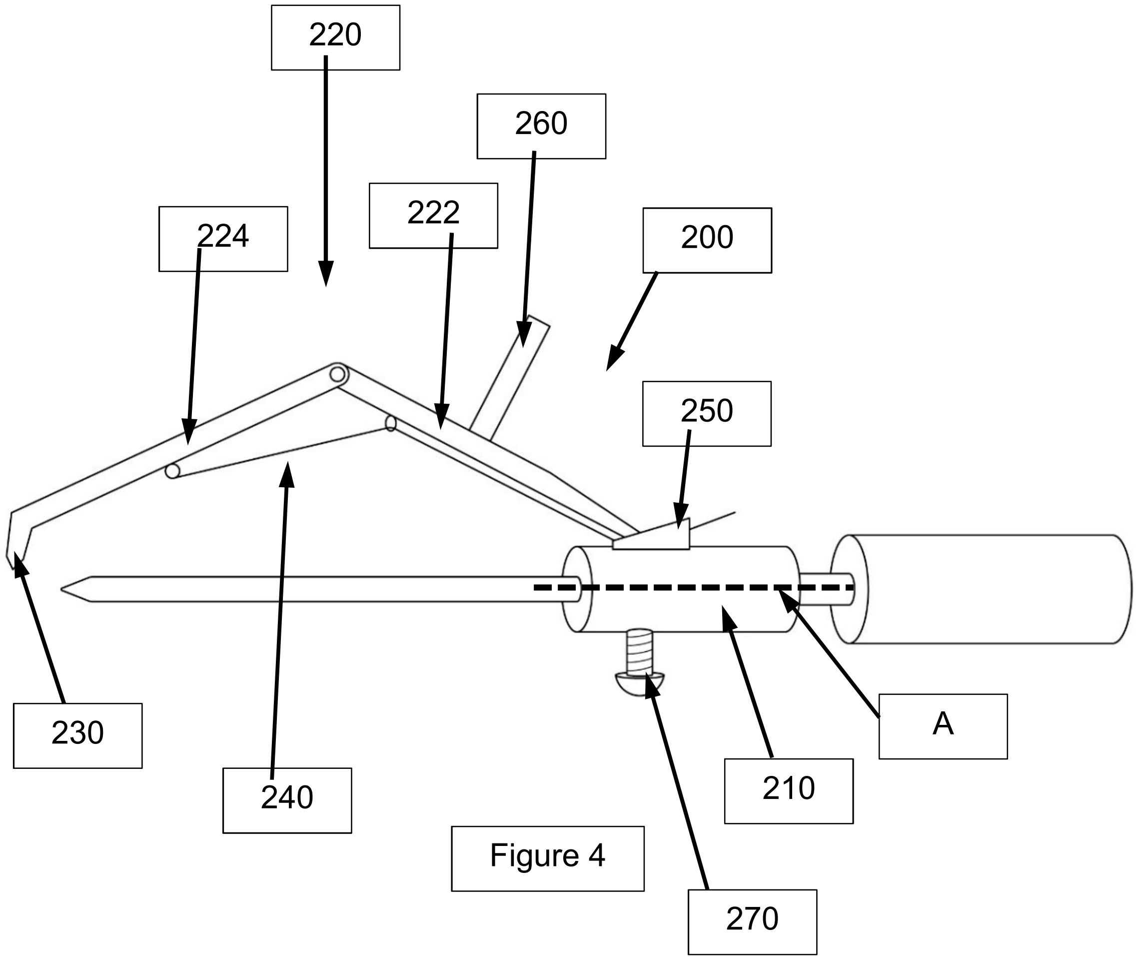

Figure 4

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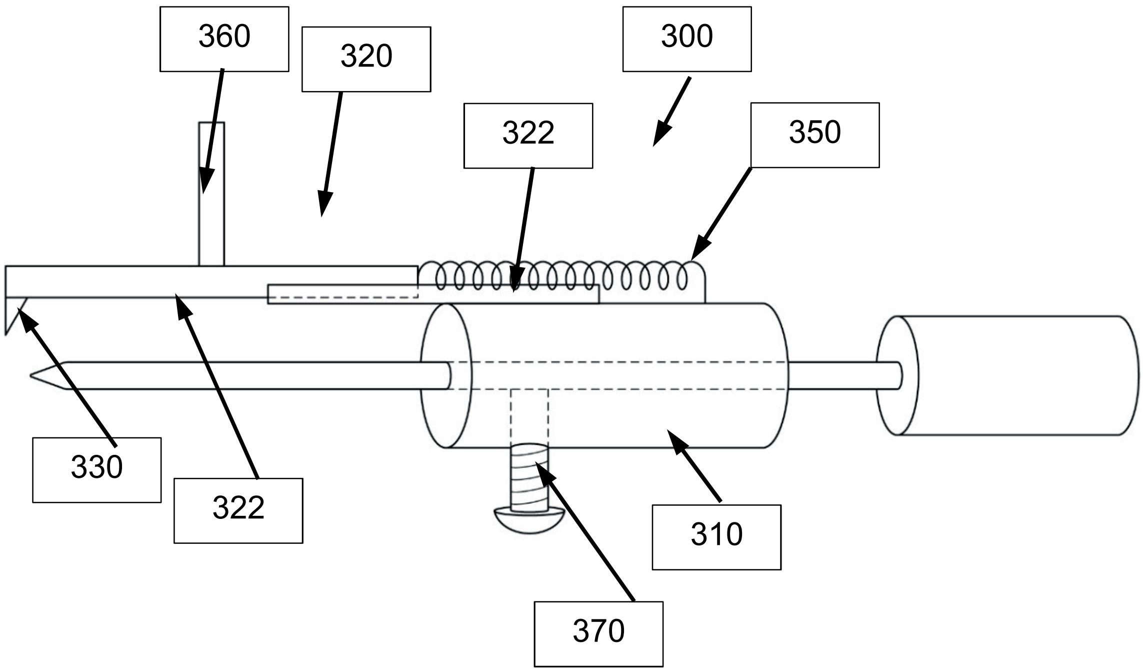

Figure 5

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