

A SELF-SUPPORTING GRIPPING DEVICE FOR USE WITH A NUT AND BOLT ASSEMBLY

Field of Invention

The invention generally relates to tools for gripping nuts and bolts,
5 especially a self-supporting gripping device for use with a nut and bolt assembly,
which can be used to securely grip a nut or bolt of the nut and bolt assembly
such that the nut and bolt assembly is safely and conveniently tightened or
removed. The invention also relates to a method for gripping a nut or bolt of a
nut and bolt assembly.

Background

In a widely used traditional method for installing or dismantling a pipe
spool in a vessel, a bolt head of a nut and bolt assembly for fixing the pipe spool
is held by a worker using a ring spanner while the nut of the assembly is
tightened or removed by another worker using another ring spanner. This
15 traditional method requires cooperation between two workers. It has been
observed that this traditional method poses many safety risks, e.g. (i) workers
may be hit or pinched by the ring spanners or by structures or components which
have been dismantled, (ii) workers may hammer their own hands, and (iii) as
workers sometimes have to work in a very constrained space, this makes
20 tightening and removing the nut and bolt assembly very difficult.

It is therefore desirable to eliminate safety risks mentioned above and
reduce manpower required for tightening or removing nut and bolt assembly.

Summary of Invention

Embodiments of the invention provide a safe and manpower-efficient self-supporting gripping device for use with a nut and bolt assembly when tightening or removing the nut and bolt assembly.

5 According to one aspect of the invention, a self-supporting gripping device for use with a nut and bolt assembly is provided. The gripping device comprises:

 a main body having a fixed frame;

 an adjustable frame movably cooperable with the fixed frame to define an opening therebetween;

10 an attachment mechanism provided at the main body for releasably attaching the main body to a neighbouring structure on which the nut and bolt assembly is installed and maintaining attachment thereto without user intervention; and

 a positioning mechanism provided at the main body and coupled to the
15 adjustable frame for positioning the adjustable frame in a gripping position in which the fixed and the adjustable frame securely grip a nut or bolt of the nut and bolt assembly received into the opening.

 In one embodiment of the invention, the attachment mechanism includes a magnet such that the gripping device or main body can be magnetically
20 attached to the neighbouring structure without user intervention.

 According to a second aspect of the invention, a method for gripping a nut or bolt of a nut and bolt assembly is provided. The method comprises:

 providing a self-supporting gripping device comprising:

a main body having a fixed frame, an adjustable frame, an attachment mechanism provided at the main body, and a positioning mechanism provided at the main body and coupled to the adjustable frame,

the method comprising:

5 using the attachment mechanism, releasably attaching the main body to a neighbouring structure on which the nut and bolt assembly is installed and maintaining attachment thereto without user intervention, and

 using the positioning mechanism, positioning the adjustable frame in a gripping position in which a nut or bolt of the nut and bolt assembly received into
10 an opening defined by the fixed frame and the adjustable frame is securely gripped.

 With the gripping device provided by embodiments of the invention, a nut and bolt assembly to be tightened or removed can be securely gripped by the gripping device instead of by a worker or human. Consequently, the safety risks
15 posed by the traditional method for tightening or removing a nut and bolt assembly can be significantly eliminated and the manpower required for tightening or removing the nut and bolt assembly will be reduced by half. Accordingly, a safer and more efficient work environment will be provided.

Brief Description of the Drawings

20 The invention will be described in detail with reference to the accompanying drawings, in which:

Figure 1A is a plan view of a self-supporting gripping device in a gripping position according to a first embodiment of the invention;

Figure 1B is a plan view of the gripping device in a non-gripping position according to the first embodiment of the invention;

5 Figure 2A is a plan view of the main plate of the gripping device as shown in Figure 1A and 1B;

Figure 2B is a plan view of the elongate handle and adjustable frame of the gripping device as shown in Figure 1A and 1B;

10 Figure 2C is a plan view of the fixed frame of the gripping device as shown in Figure 1A and 1B;

Figure 3A is a side view of the gripping device in a gripping position as shown in Figure 1A;

Figure 3B is a side view of the gripping device in a non-gripping position as shown in Figure 1B;

15 Figure 4A is a perspective view of a gripping device in a gripping position, which is fabricated according to the first embodiment of the invention;

Figure 4B is a perspective view of the gripping device in a non-gripping position, which is fabricated according to the first embodiment of the invention;

20 Figure 5A is a plan view of a gripping device in a gripping position according to a second embodiment of the invention;

Figure 5B is a plan view of a gripping device in a non-gripping position according to the second embodiment of the invention;

Figure 6 is a flow chart illustrating a method for gripping a nut or bolt of a nut and bolt assembly according to one embodiment of the invention;

5 Figure 7A is a side perspective view of a gripping device attached to an underside or lower surface of a pipe flange and in a self-supported position; and

Figure 7B is a bottom view of Figure 7A and shows the gripping device in a gripping position.

Detailed Description of Embodiments of the Invention

10 In the following description, numerous specific details are set forth in order to provide a thorough understanding of various illustrative embodiments of the invention. It will be understood, however, to one skilled in the art, that embodiments of the invention may be practiced without some or all of these specific details. It is understood that the terminology used herein is for the
15 purpose of describing particular embodiments only, and is not intended to limit the scope of the invention. In the drawings, like reference numerals refer to same or similar functionalities or features throughout the several views.

As used herein, the articles “a”, “an” and “the” as used with regard to a feature or element include a reference to one or more of the features or
20 elements.

As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.

As used herein, the terms “first,” “second,” and “third,” etc. are used merely as labels, and are not intended to impose numerical requirements on
5 their objects.

Figure 1A is a plan view of a self-supporting gripping device 10 in a gripping position according to a first embodiment of the invention. Figure 1B is a plan view of the gripping device 10 in a non-gripping position according to the first embodiment of the invention.

10 In this embodiment, as shown in Figure 1A and Figure 1B, the gripping device 10 comprises a main body 100, an adjustable frame 140, an attachment mechanism 160 and a positioning mechanism 180.

The main body 100 includes a main plate 110 having a front side which is provided with a fixed frame 120.

15 The adjustable frame 140 is movably cooperable with the fixed frame 120 to define an opening therebetween.

The attachment mechanism 160 is provided at the main plate 110 for releasably attaching the main plate 110 to a neighbouring structure on which the nut and bolt assembly is installed and for maintaining attachment thereto without
20 user intervention. In this embodiment, the attachment mechanism 160 includes

four magnet elements 160a -160d, which is adapted to magnetically attach the main body 100, e.g. main plate 110, to a neighbouring structure.

The positioning mechanism 180 is coupled to the adjustable frame 140 for positioning the adjustable frame 140 in a gripping position in which the fixed frame 120 and the adjustable frame 140 securely grip the nut or bolt received into the opening. In this embodiment, the positioning mechanism 180 includes an elongate handle 181, a first resilient means 182 and a locking mechanism 183.

The detailed structure of each component of the gripping device 10 will be explained with reference to Figures 2A-2C and 3A-3B.

Figure 2A shows a plan view of the main plate 110 in Figure 1A and Figure 1B. Referring to Figure 2A, the main plate 110 has a hexagonal hole 112 for allowing the nut or bolt of the nut and bolt assembly to pass through and to be received into the opening defined by the fixed frame 120 and the adjustable frame 140. The main plate 110 is also provided with multiple openings, e.g. four openings 114a-114d for holding the four magnet elements 160a-160d respectively. Specifically, the four magnet elements 160a -160d are respectively disposed or installed in the four openings 114a-114d on the main plate 110 to allow the main plate 110 firmly but releasably attach to a neighbouring structure on which the nut and bolt assembly is installed.

It should be noted that the shape and dimension of the main plate and its hexagonal hole 112, the number of the magnet elements, the method for attaching the magnet elements to the main plate in this embodiment are

provided for illustrative purpose only, and not used to limit the scope of the invention. In other embodiments of the invention, these parameters and method may be adjusted according to actual demand. For example, the number of magnet elements may be less than 4 as long as the main plate can be firmly
5 attached to the neighbouring structure or may be more than 4; the hexagonal hole 112 on the main plate may be provided as other geometric or non-geometric shape to conform to a specific type of bolt or nut. The attachment mechanism may be provided at other part of the main body 100 in other embodiments, e.g. the fixed frame 120.

10 Figure 2B shows a plan view of the elongate handle 181 and the adjustable frame 140 in Figure 1A and 1B. In this embodiment, the elongate handle 181 is a cylindrical bar which has a first end attached to the V-shaped adjustable frame 140. To conveniently and safely carry, operate or keep the gripping device 10, a pull ring 184 is attached to a second end of the elongate
15 handle 181, which is adapted to receive user actuation. A person skilled in the art will appreciate that the shape of the elongate handle 181, the adjustable frame 140, and the pull ring 184 in this embodiment are only for illustrative purpose, and not used to limit the scope of the invention.

Figure 2C shows a plan view of the fixed frame 120 of the main body 100
20 in Figure 1A and Figure 1B. Referring to Figures 1A or 1B and Figure 2C, the fixed frame 120 is a pentagonal structure including five edges 121-125, which is provided at the front side of the main plate 110. The adjustable frame 140 is disposed within the fixed frame 120 and movably cooperable with edges 121-

124 of the fixed frame 120 to define an opening therebetween for securely gripping the received bolt or nut when the gripping device 10 is in use, i.e. the adjustable frame 140 is in a gripping position in which the fixed frame 120 and the adjustable frame 140 securely grip the nut or bolt of the nut and bolt assembly. It should be noted that the shape and size of the fixed frame 120 may be adjusted according to shape and size of the nut and the bolt in other embodiments. It is not necessary for the fixed frame to include all of the five edges 121-125 to form an enclosed structure. In other embodiments, it may only include the four edges 121-124 as long as the fixed frame is cooperable with the adjustable frame to form an enclosed opening to securely grip the nut or bolt.

Figure 3A shows a side view of the gripping device 10 as shown in Figure 1A. Referring to Figure 1A and Figure 3A, in this embodiment, the positioning mechanism 180 is a spring-actuable positioning mechanism, which includes an elongate handle 181, a first resilient means 182, e.g. spring, and a locking mechanism 183.

The elongate handle 181 has two ends, the first end is attached to the adjustable frame 140, and the second end is adapted to receive user actuation. A fixed sleeve 116 is provided at the front side of the main plate 110. The elongate handle 181 is passed through the fixed sleeve 116 and slidable therethrough. The fixed sleeve 116 may be welded to the main plate 110 or integrally formed with the main plate 110.

The first resilient means 182 resiliently supports the adjustable frame 140 against the edge 125 of the fixed frame 120 for biasing the adjustable frame 140

to the gripping position in which the fixed frame 120 and the adjustable frame 140 securely grip the nut or bolt of the nut and bolt assembly. In another embodiment, if the fixed frame 120 does not include the edge 125, the first resilient means 182 may be resiliently supported against another suitable fixed portion of the main body 100, e.g. the fixed sleeve 116 provided at the main plate 110.

The locking mechanism 183 may be provided at the fixed sleeve 161 or other suitable part of the main body 100 , which is adapted to engage with the elongate handle 181 to maintain the first resilient means 182 and the adjustable frame 140 in a non-gripping position in which the opening defined by the fixed frame 120 and the adjustable frame 140 allows the nut or bolt to be received therein or released therefrom. In other words, in the non-gripping position, the dimension of the opening defined by the fixed frame 120 and the adjustable frame 140 is larger than the nut or bolt to be gripped. As shown in Figure 1A and Figure 3B, in this embodiment, when the adjustable frame 140 is in the non-gripping position, the first resilient means 182 is in a compressed state such that the opening defined by the fixed frame 120 and the adjustable frame 140 is sufficiently large to accommodate the bolt or the nut to be received therein or released therefrom, whereas when the adjustable frame 140 is in the gripping position, the first resilient means 182 is in a released state to bias and maintain the adjustable frame 140 in the gripping position.

As shown in Figure 3A and 3B, the locking mechanism 183 includes a support structure 1831, a movable locking bar 1832 having a first end 1833 and

a second end 1834 opposed to each other, and a second resilient means 1835, e.g. spring.

The support structure 1831 extends from the fixed sleeve 116 while the movable locking bar 1832 is pivotably coupled to the support structure 1831, e.g. by a screw. The second resilient means 1835 resiliently supports the first end 1833 of the movable locking bar 1832 against the fixed sleeve 116 while the second end 1834 of the movable locking bar 1832 includes an engagement member which is adapted to engage with the elongate handle 181 to maintain the first resilient means 182 in a compressed state and the adjustable frame 140 in the non-gripping position. In this embodiment shown in Figures 3A and 3B, the engagement member at the second end 1834 of the movable locking bar 1832 is adapted to be inserted into a pit opening on the elongate handle 181 and engage with an edge defining the pit opening to maintain the adjustable frame 140 in the non-gripping position.

Figure 4A and Figure 4B respectively show perspective views of a gripping device in a gripping and a non-gripping position, which is fabricated according to the first embodiment of the invention.

It should be noted that the spring-actuable positioning mechanism 180 in this embodiment is provided only for illustrative purpose, and not used to limit the scope of the invention. Any positioning mechanism which can be used to position and maintain the adjustable frame 140 in the gripping position or non-gripping position may be applied to this invention. For example, a non spring-actuable positioning mechanism may be used and includes: (i) an elongate

handle, e.g. similar to the elongate handle 130, having a first end attached to the adjustable frame and a pull ring attached to a second end of the elongate handle, (ii) a fastener provided at the main body or main plate to fasten or secure the elongate handle to the main body or main plate in order to maintain the
5 elongate handle in the gripping position. An illustrative example of the fastener is a U-shape structure having two legs connected by an arcuate or curved shoulder, wherein one of the legs is pivotably or movably coupled to the fixed sleeve provided at the main plate 110 while the other leg is adapted to release or secure the elongate handle to the main body or main plate to maintain the
10 adjustable frame in the gripping position.

To prevent unwanted movement of the main plate 110 along a surface of the neighbouring structure on which the nut and bolt assembly is installed, as shown in Figures 3A and 3B, the gripping device 10 may further include a stopper 190 which is attached to the rear side of the main plate 110 and adapted
15 to mount to an edge of the neighbouring structure on which the nut and bolt assembly is installed.

As the neighbouring structure may be circular, e.g. pipe flange, the stopper 190 may be designed to include a curved edge adapted to fit onto the neighbouring structure, as shown in Figure 3B. Typically, the stopper includes a
20 metal material, e.g. stainless steel. Figure 7A is a side perspective view of a gripping device 10/20 being releasably attached or mounted to an underside or lower surface of a pipe flange 30 and self-supported while its stopper is abutted against an edge surface of the pipe flange 30. Figure 7B is a plan view of Figure

7A and shows the gripping device 10/20 in a gripping position. It is to be appreciated that the gripping device 10/20 may be mounted to a topside (upper surface) or an underside (lower surface) of a pipe flange 30 for gripping a bolt head or a nut 40.

5 To detect whether the nut or bolt has been securely gripped by the gripping device 10, the gripping device 10 may further include at least one pressure sensor 191 disposed on inner surface of the fixed frame 120. In one example, two pressure sensors 190 are respectively disposed on the edges 121 and 122 of the fixed frame 120 which are respectively opposite to edges of the adjustable frame 140, as shown in Figure 2C.

 The gripping device 10 may further include a rubber pad 192 disposed on at least a portion of inner surface of the fixed frame 120. In one example, two separate rubber pads 192 are disposed on the edges 121 and 122 of the fixed frame 120 which are respectively opposite to edges of the adjustable frame 140, as shown in Figure 2C. When the nut or bolt is gripped by the gripping device, the rubber pad 192 may provide increased frictional grip to the nut or bolt being gripped and/or shock absorption (cushion) during operation of the gripping device.

 To prevent access to the opening defined by the fixed frame 120 and the adjustable frame 140 from the front side of the main plate 110, a rigid or semi-rigid cover 193 may be provided to cover the fixed frame 120. The cover 193 may be pre-cut in geometric design to enable the cover to conform to the shape of the fixed frame 120. The cover 193 may be formed to snugly fit to the upper

edge of the fixed frame 120, or be fixed to the upper surface of the fixed frame 120 by screws or other means.

Preferably, the components of the gripping device 10 especially the main body 100, the adjustable frame 140, the elongate handle 181, and the stopper 5 190 includes a metal material, e.g. stainless steel.

Figure 5A and Figure 5B are plan views of the gripping device 20 in gripping position and non-gripping position respectively, according to a second embodiment of the invention. In this embodiment, the positioning mechanism 280 includes an elongate handle 281 having a first end attached to the 10 adjustable frame 240 and a second end adapted to receive user actuation, and a locking mechanism which includes a threaded locking nut 282 provided at the front side of main plate 210 and adapted to engage with a complementarily threaded portion of the elongate handle 281 to maintain the adjustable frame in the gripping position in which the fixed frame 220 and the adjustable frame 240 15 securely grip the received nut or bolt or in a non-gripping position in which the opening defined by the fixed frame 220 and the adjustable frame 240 allows the nut or bolt to be received therein or released therefrom.

Figure 6 is a flow chart illustrating a method for gripping a nut or bolt of a nut and bolt assembly according to one embodiment of the invention.

20 In block 601, a self-supporting gripping device is provided.

The gripping device may be the gripping device 10 shown in Figure 1A and 1B or the gripping device 20 shown in Figure 5A and 5B.

In block 602, assuming the gripping device is initially in a gripping position, the adjustable frame, using the positioning mechanism, is moved to a non-gripping position in which the nut or bolt to be gripped can be received into or accommodated in the opening defined by the fixed frame and the adjustable frame, and maintained in the non-gripping position.

If the gripping device 10 of Figures 1A-1B is used, the adjustable frame 140 is moved to the non-gripping position by pulling the elongate handle 181 of the positioning mechanism 180. Subsequently, the locking mechanism 183 of the positioning mechanism 180 is engaged with the elongate handle 181 to maintain the adjustable frame 140 in the non-gripping position.

If the gripping device 20 of Figures 5A-5B is used, the adjustable frame 240 is moved to the non-gripping position by turning the elongate handle 281 to position and maintain the adjustable frame 240 in a non-gripping position.

Block 602 is optional as it should be noted that if the initial state of the gripping device in a non-gripping position, this step of moving the adjustable frame may not be necessary. For example, for the gripping device 10, if the initial state of the gripping device 10 is in a non-gripping position, i.e. the adjustable frame 140 is maintained in a non-gripping position by engaging the second end of the movable locking bar with the elongate handle 181 and therefore this step (block 602) is not necessary.

In block 603, as the nut or bolt to be gripped is received into the opening defined by the fixed frame and the adjustable frame, the main body of the

gripping device, using the attachment mechanism, is releasably attached to a neighbouring structure on which the nut and bolt assembly is installed. The attachment between the main body and the neighbouring structure can therefore be maintained without user intervention or support.

5 In the gripping device 10/20, the attachment mechanism is provided by magnet elements provided at the main plate of the main body such that the main body can be magnetically attached to the neighbouring structure without user intervention. However, it is to be appreciated by a person skilled in the art that in other embodiments, the attachment mechanism may be provided in other ways.

10 In block 604, the adjustable frame, using the positioning mechanism 180, is moved to the gripping position such that the nut or bolt received into the opening is securely gripped by the fixed frame 120 and the adjustable frame 140 and is maintained in the gripping position.

 If the gripping device 10 of Figures 1A-1B is used, in order to move the
15 adjustable frame 140 to the gripping position, the first end of the movable locking bar 1831 is pressed to disengage or release the second end of the movable locking bar 1831 from the elongate handle 181 such that the adjustable frame 140 is automatically biased to the gripping position by the first resilient means 182 of the positioning mechanism 180. Subsequently, the adjustable frame 140
20 is maintained or biased in the gripping position by the first resilient means 182.

 If the gripping device 20 of Figures 5A-5B is used, in order to move the adjustable frame 240 to the gripping position, the elongate handle 281 is turned

such that the locking nut threadably engages with the elongate handle 281 to position and move the adjustable frame to the gripping position. Subsequently, the adjustable frame 140 is maintained in the gripping position by the threaded engagement between the locking nut and the elongate handle.

5 It should be noted that the method described above is only for illustrative purpose, not used to limit the scope of the invention. The steps of the method for gripping a nut or bolt according to other embodiments of the invention may be adjusted according to actual design of the positioning mechanism.

10 The embodiments of the invention provide a self-supporting gripping device for use with a nut and bolt assembly. With this gripping device, only one worker is required to tighten or remove a nut and bolt assembly since the other worker who holds the nut or bolt in the traditional method is now replaced with the self-supporting gripping device. Furthermore, the biasing first resilient means of the gripping device of Figures 1A-1B is adapted to automatically fit the
15 adjustable frame to a nut or bolt accommodated in the opening such that the nut or bolt is secured between the fixed and the adjustable frame. Since no human intervention is required to hold or secure the nut or bolt during tightening or removing of the nut or bolt, the safety risks posed by the traditional method of tightening or removing a nut and bolt assembly are significantly eliminated yet
20 allowing the manpower required to be significantly reduced.

It is to be understood that the embodiments and features described above should be considered exemplary and not restrictive. Many other embodiments will be apparent to those skilled in the art from consideration of the specification

and practice of the invention. The scope of the invention should, therefore, be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. Furthermore, certain terminology has been used for the purposes of descriptive clarity, and not to limit the
5 disclosed embodiments of the invention.

Claims

1. A self-supporting gripping device for use with a nut and bolt assembly, the device comprising:

a main body having a fixed frame ;

5 an adjustable frame movably cooperable with the fixed frame to define an opening therebetween;

an attachment mechanism provided at the main body for releasably attaching the main body to a neighbouring structure on which the nut and bolt assembly is installed and maintaining attachment thereto without user

10 intervention; and

a positioning mechanism provided at the main body and coupled to the adjustable frame for positioning the adjustable frame in a gripping position in which the fixed and the adjustable frame securely grip a nut or bolt of the nut and bolt assembly received into the opening.

15 2. The device of claim 1, wherein the positioning mechanism includes:

an elongate handle having a first end attached to the adjustable frame and a second end adapted to receive user actuation,

a first resilient means resiliently supporting the adjustable frame against a fixed portion of the main body for biasing the adjustable frame to the gripping

20 position, and

a locking mechanism provided at the main body and adapted to engage with the elongate handle to maintain the first resilient means and the adjustable frame in a non-gripping position in which the opening defined by the fixed frame and the adjustable frame allows the nut or bolt to be received therein or released therefrom.

3. The device of any of claim 2, wherein the main body includes a fixed sleeve wherein the elongate handle is passed through the fixed sleeve,

wherein the locking mechanism includes:

a support structure extending from the fixed sleeve,

10 a movable locking bar pivotably coupled to the support structure and having a first and a second opposed end portion, and

a second resilient means resiliently supporting the first end portion of the locking bar against the fixed sleeve,

15 wherein the second end portion of the locking bar includes an engagement member which is adapted to engage with the elongate handle to maintain the first resilient means and the adjustable frame in the non-gripping position.

4. The device of any of claims 2 to 3, wherein the first and/or the second resilient means includes a spring member.

20

5. The device of claim 1, wherein the positioning mechanism includes:

an elongate handle having a first end attached to the adjustable frame and a second end adapted to receive user actuation, and

a locking mechanism including a threaded locking nut provided at the main body, and adapted to engage with a complementarily threaded portion of the elongate handle to maintain the adjustable frame in the gripping position or in a non-gripping position in which the opening defined by the fixed frame and the adjustable frame allows the nut or bolt to be received therein or released therefrom.

6. The device of any preceding claim, wherein the attachment mechanism includes a magnet.

7. The device of any preceding claim, further comprising: a stopper provided on a rear side of the main body, wherein the stopper is adapted to mount to an edge of the neighbouring structure.

8. The device of claim 6, wherein the stopper includes a curved edge adapted to fit onto a pipe flange.

9. The device of any preceding claim, further comprising:

at least one pressure sensor disposed on inner surface of the fixed frame to detect whether the nut or bolt is securely gripped.

10. The device of any preceding claim, further comprising:

a rubber pad disposed on at least a portion of inner surface of the fixed frame to provide frictional grip and/or shock absorption to the nut or the bolt when the nut or the bolt is securely gripped by the fixed and the adjustable
5 frame.

11. The device of any preceding claim, further comprising:

a rigid or semi-rigid cover attached to the fixed frame to prevent access to the opening defined by the fixed frame and the adjustable frame from a front side of the main body.

10 12. The device of claim 2 or claim 5, wherein the positioning mechanism further comprises:

a pull ring disposed at the second end of the elongate handle.

13. The device according to any preceding claim, wherein the fixed frame includes a multi-edge structure configured to cooperate with the adjustable frame
15 to define a hexagonal opening.

14. The device according to any preceding claim, wherein the main body and the adjustable frame include stainless steel.

15. A method for gripping a nut or bolt of a nut and bolt assembly, the method comprising:

providing a self-supporting gripping device comprising:

5 a main body having a fixed frame, an adjustable frame, an attachment mechanism provided at the main body, and a positioning mechanism provided at the main body and coupled to the adjustable frame,

the method further comprising:

10 using the attachment mechanism, releasably attaching the main body to a neighbouring structure on which the nut and bolt assembly is installed and maintaining attachment thereto without user intervention, and

using the positioning mechanism, positioning the adjustable frame in a gripping position in which a nut or bolt of the nut and bolt assembly received into an opening defined by the fixed frame and the adjustable frame is securely gripped.

15 16. The method of claim 15, wherein the positioning mechanism includes an elongate handle having a first end attached to the adjustable frame and a second end, a first resilient means resiliently supporting the adjustable frame against a fixed portion of the main body, and a locking mechanism provided at the main body,

20 wherein before attaching the main body to the neighbouring structure, the method further comprising:

using the second end of the elongate handle, moving the adjustable frame to a non-gripping position such that the opening defined by the fixed frame and the adjustable frame allows the nut or bolt to be received thereinto, and

engaging the locking mechanism with the elongate handle to maintain the
5 adjustable frame in the non-gripping position;

wherein the step of positioning the adjustable frame in the gripping position comprises:

disengaging the locking mechanism from the elongate handle to allow the first resilient means automatically bias the adjustable frame to the gripping
10 position.

17. The method of claim 16, wherein the main body includes a fixed sleeve wherein the elongate handle is passed through the fixed sleeve, wherein the locking mechanism includes:

a support structure extending from the fixed sleeve,

15 a movable locking bar pivotably coupled to the support structure and having a first and a second opposed end portion, wherein the second end portion of the locking bar includes an engagement member and

a second resilient means resiliently supporting the first end portion of the locking bar against the fixed sleeve,

20 wherein the step of engaging the locking mechanism with the elongate handle comprises: engaging the engagement member of the second end portion

of the locking mechanism with the elongate handle to maintain the adjustable frame in the non-gripping position;

wherein the step of disengaging the locking mechanism from the elongate handle comprises: disengaging the engagement member of the second end
5 portion of the locking mechanism from the elongate handle to allow the first resilient means automatically bias the adjustable frame to the gripping position.

18. The method of any of claims 16 to 17, wherein the first and/or the second resilient means includes a spring member.

19. The method of claim 15, wherein the positioning mechanism includes an
10 elongate handle having a first end attached to adjustable frame and a second end, and a locking mechanism including a threaded locking nut provided at the main body,

wherein the step of positioning the adjustable frame in a gripping position comprises:

15 engaging the locking nut with threads on the elongate handle to position the adjustable frame in the gripping position.

20. The method of claim 19, wherein the method further comprises:

turning the elongate handle to position the adjustable frame in a non-gripping position in which the opening defined by the fixed frame and the
20 adjustable frame allows the nut or bolt to be received therein or released therefrom.

21. The method according to any of claims 15 to 20, the attachment mechanism includes a magnet.

22. The method according to any of claims 15 to 21, wherein the gripping device further comprises a stopper provided on a rear side of the main body, wherein
5 the method further comprising:

mounting the stopper to an edge of the neighbouring structure when attaching the main body to the neighbouring structure.