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(54) Tool for turning or exerting a torque on mechanical fastening members, and method for using it

(57) The tool (1) comprises a) a shank (3); b) a driven element (5) comprising a socket (6) suitable for engaging with a nut or screw (B) so as to rotate the latter around an engagement axis (AS) and screwing or unscrewing it; c) an articulation (4) connecting the shank (3) and the driven element (5) so as to allow them to rotate one relative the other around a pivoting axis (AC). According to the invention the engagement (AS) and pivoting axes (AC) are skew each to the other. This way tools (1) can be made suitable for an equivalent use to double hexagon socket tools, for unscrewing nuts or screws (B) set in positions not easy to be reached, the socket (6) of the tools (1) being not only hexagonal, but having any shape and an improved wear resistance.

The invention moreover relates to a method for using the tool (1).

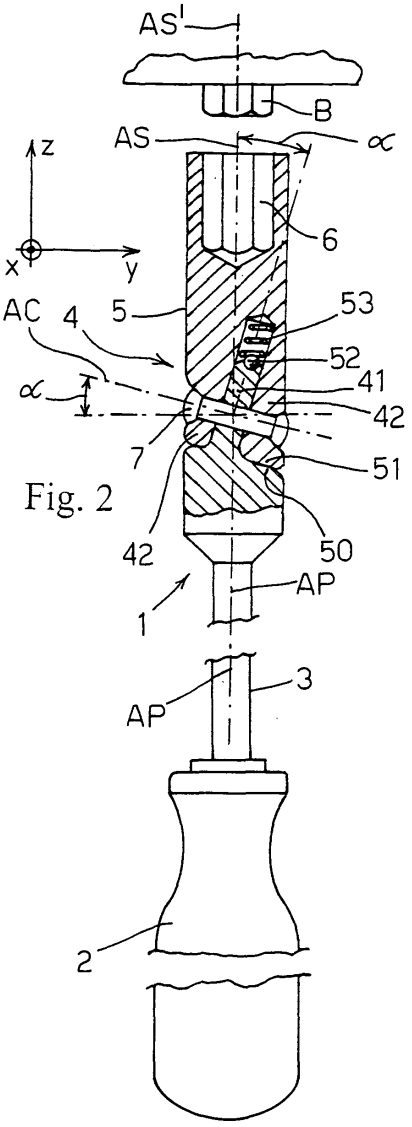

Fig. 2

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Description

Field of the Invention

[0001] The present invention relates to a tool for turning or applying torques to mechanical fastening elements , such as nuts and screws, arranged in positions not easy to be reached.

[0002] The invention relates moreover to a method for using the above-mentioned tool.

Background art

[0003] At present several technical solutions are known for making hand-held tools used for mechanics jobs, such as wrenches or screwdrivers, more versatile and practical for use.

[0004] A first problem arising for example in garage jobs is unscrewing a nut or a screw that initially is solidly blocked, for example due to rusting or oxydations.

[0005] In order to both applying a great initial unscrewing torque with hand-held tools and quickly unscrewing the screw or nut after having unblocked it, wrenches or screwdrivers has been proposed provided with one or more articulations, such as in the documents US 4 461 192 (Suligoy, Cook), US 4 344 445 (R.T. Tool Co. Ldt), US 6 314 844 (Warner, Petersen), US 1 701 037 (Hebeler): according to the required unscrewing/screwing torque, thanks to the articulation the tool can be used either like an elbowed wrench or a normal screwdriver or like wrench with straight shank.

[0006] Each one of such articulated tools can carry out the functions of one or more tools lacking articulations - for example the functions both of a rigid elbowed wrench and of a straight rigid shank screwdriver- and allows the user to finish a screwing/unscrewing operation using a smaller number of tools, with consequent time saving because the number of "take-and-rests" operations, for laying a tool down and grabbing another one, is reduced.

[0007] Another problem arising in garage jobs is unscrewing a nut or screw arranged in a position not easy accessible.

[0008] In order to solve such problem, according to each particular case the tools of the above-cited documents or other tools can be suitable, such as the ones described in the documents US 5 199 335 (Easco Hand Tools), US 3 670 605 (Doelring MFG Corp.) or US 1 498 712 (York).

[0009] Another known solution for unscrewing hexagonal nuts and bolts arranged in positions not easily accessible is using wrenches with double hexagon socket (Figure 1): the double hexagon socket allows or facilitates unscrewing hexagonal head nuts and screws for example using an elbowed wrench also in spite of surrounding obstacles that prevent the wrench handle to be rotated with a wide rotation angle.

[0010] However double hexagon sockets, in comparison with simple hexagon sockets and under the same conditions undergo a faster wear and are stripped with smaller screwing/unscrewing torques, and hence they need to be manufactured in materials and with more expensive heat treatments and workings in general. Moreover manufacturing of a double hexagon socket is generally more expensive and laborious than manufacturing a simple hexagon socket also due to its shape.

[0011] An object of the present invention is providing a tool that is an improvement in comparison with the known tools, with particular reference to versatility of use, to the wear to which it is subject during the use, to the possibility of being used for screwing/unscrewing screws, nuts or other mechanical elements arranged in not easily accessible positions and of both allowing to apply great screwing/unscrewing torques, and to quickly unscrew/screw a nut, a screw or other mechanical elements with low screwing/unscrewing torques.

Summary of the Invention

[0012] In a first aspect of the present invention, this object is achieved with a tool having the features according to claim 1.

[0013] In a second aspect of the present invention, such object is achieved with a method having the features according to claim 10.

[0014] The dependent claims relate to preferred embodiments of the present invention.

[0015] Thanks to the skew position of the pivoting axis relative the tool engagement axis it is possible to make tools to be used like known double hexagon socket tools, for screwing and unscrewing mechanical fastening elements - such as screws or nuts- set in positions not easy to be reached. Unlike double hexagon socket tools, the tools according to the present invention can use engagement portions having not only hexagonal or polygonal shape, but any shape - for example having cross-shaped, star-shaped, Torx-type or generally multilobed engagement portions.

[0016] Moreover it is possible to make tools having engagement portions with simpler and compact shapes in general, and therefore -considering for example same materials and heat treatments- more wear-resistant and suitable for transmitting greater screwing/unscrewing torques. These advantages are better understood for example from the comparison of a tool according to the invention having a per se known double-hexagon socket.

[0017] The tool can be used both with bent articulation - for example like an elbowed wrench- for applying high screwing or unscrewing torques, and with extended articulation, like a normal screwdriver, for example for quickly unscrewing or screwing a nut or a screw needing low screwing or unscrewing torques, for example because it has already been unblocked.

[0018] That is, the invention allows making a versatile tool for screwing and unscrewing mechanical fastening elements such as nuts or screws arranged in positions not easy to be reached.

[0019] Further advantages that can be attained with the present invention will rotate out more obvious, to the skilled person, from the following detailed description of some particular and non-limiting embodiments shown in the following schematic figures.

List of Figures

[0020]

Figure 1 shows a front view of a double hexagon socket tool tip, per se known;
Figure 2 shows the side view, partially in cross-section, of a first preferred embodiment of a tool according to the present invention;
Figure 3 shows three overlapping side views of the tool of Figure 2, in which the tool articulation is folded like an elbow on one side (condition I), is completely extended (condition II) and is folded like an elbow from the opposite side (condition III) respectively;
Figure 3A shows a view, according to the space direction X, of the tool of Figure 3 folded like an elbow on one side (condition of Figure 3);
Figure 3B shows a view, according to the space direction Z, of the tool of Figure 3 completely extended (condition II of Figure 3);
Figure 3C shows a view, according to the space direction X, of the tool of Figure 3 folded like an elbow on one side (condition III of Figure 3) after having been rotated of 180° around axis AP of its shank;
the Figures 4A-4C show three moments of a sequence of use of the tool of Figure 2;
Figure 5 shows a side view, partially in cross-section, of a second preferred embodiment of a tool according to the present invention;
Figure 6 shows side view, partially in cross-section, of a third preferred embodiment of a tool according to the present invention.

Detailed description

[0021] In the present description, when the axis of an object will be referred to without further details, this has to be understood as the axis of axial or radial symmetry if the object has even a squat shape or an axial or radial symmetry, or the longitudinal direction of an oblong object. The expressions "longitudinally" or "axially" relative a given object, without further details, have to be understood as directions substantially parallel to the axial or radial symmetry axis of the object at issue, if this object is even a squat object but has however an axial or radial symmetry, or as the longitudinal directions of an oblong object.

[0022] The references X, Y, Z indicate a system of three space orthogonal coordinates referred to in Figure 2, and referred to coherently in other figures.

[0023] Figure 1 shows a first preferred embodiment of a tool according to the present invention: such tool, indicated with the overall reference 1, comprises a handle 2 to which a shank 3 is fixed which will be also referred to, in the present description, as "driving element 3".

[0024] A second element 5 - in the present description referred to as "driven element 5"- is hinged to an end of the shank 3, so as to form an articulation 4.

[0025] In the present embodiment, the driven element 5 has approximately cylindrical shape, and at the top of its free end a hexagon socket 6 is provided, coaxial with the approximately cylindrical outer surface of driven element 5; reference AS refers to their common axis.

[0026] Socket 6 is suitable for fitting on a hexagonal nut, or on the hexagonal head B of a screw, sliding along engagement axis AS, so as to allow screwing or unscrewing the nut or screw B by turning it around its engagement and rotation axis AS'. When socket 6 is fitted on the nut or screw B, the axes AS of the socket 6 and AS' of the nut or screw AS' are substantially coincident, or they can be at least parallel relative each other.

[0027] The ends of shank 3 and of driven element 5 are hinged through axis 7, which defines the pivoting axis AC around which the shank 3 and driven element 5 rotate when articulation 4 is folded or is extended.

[0028] According to the present invention, the engagement and rotation axis AS of socket 6 and the pivoting axis AC of the articulation are skew and substantially not perpendicular relative each other.

[0029] Some advantages obtainable through this solution will be now described with reference to the embodiment of Figures 2, 3, 3A-3C, 4A-4C.

[0030] In the embodiment of Figure 2 the engagement and rotation axis AS of socket 6 and the pivoting axis AC are incident with each other and form an inclination angle α of approximately 15°.

[0031] In this embodiment, articulation 4 is suitable to fold so that, starting from the initial condition II of Figure 3 - in which the articulation 4 is extended and axes AS of socket 6 and AP of shank 3 are substantially coaxial or at least parallel to each other- the driven element 5 and shank 3 can rotate of approximately by 90° around pivoting axis AC both in counter-clockwise sense - condition I of Figure 3 (- 90°) - and in clockwise sense - condition III of Figure 3 (+90°), so as to fold like an elbowed wrench.

[0032] With such design choice, it is pointed out that:

- in the condition I of Figure 3 (articulation 4 folded elbow-wise or L-wise) the position of hexagonal socket 6 relative axes XYZ can be for example be as shown in the corresponding Figure 3A: the two lower and top sides inferior of the hexagon are substantially parallel to the axis Y;
- starting from such condition I, in condition II of Figure 3 (extended articulation 4) the position of hexagonal socket 6 relative axes XYZ is the one showed in the corresponding Figure 3B: hexagon 6 is rotated by

15° around axis AS ($\gamma' = 15°$);

- by rotating the driven element 5 by 90° again around the pivoting axis AC (condition III of Figure 3) and then rotating the element 5 and shank 3 around axis AP of the shank by about 180°, element 5 is parallel again to axis X (Figure 3C), as it was in the situation of Figure 3A but -in comparison with the condition of Figure 3A ($\gamma'' = 30°$)- the hexagon 6 is rotated by 30° around axis AS.

That is, starting from the condition of Figure 3A, the following succession of steps

- rotating the driven element 5 by 90° around axis AC (condition II of Figure 3B);
- rotating the driven element 5 by 90° again around axis AC (condition III of Figure 3);
- rotating the shank 3 and element 5 by 180° around axis AP (condition III of Figure 3C);

allows tool 1 to be used like an elbowed wrench with double hexagon socket (Figure 1), although it has actually a simple hexagon socket 6, and allowing fitting and unscrewing quickly for example nuts and screws set in positions not easy to be reached -in particular with constraints to the handle rotation when the tool is folded elbow-wise even if applying considerable screwing/unscrewing torques.

[0033] A possible movement sequence for unscrewing a hexagonal head screw B not easy accessible is shown in Figures 4A-4C:

the screw B is set in a space V that hinders the maneuvers of screwing and unscrewing. In a first step (Figure 4A) the hexagonal socket 6 is fitted on screw B, while tool 1 is in the condition I corresponding to Figures 3, 3A.

[0034] The shank 3 of the tool is rotated in the sense of the arrow F until a wall of space V does not hinders a further rotation (Figure 4B).

[0035] Afterwards the driven element 5 is removed from the head of the screw B, is rotated upwards (arrow F1 in Figure 4C) by approximately 180° around pivoting axis AC and then rotated approximately by 180° in the direction of the arrow F2 of Figure 4C; shank 3 is therefore rotated around the engagement and rotation axis AS of the screw B in a direction opposite to the one of arrow F of Figure 4, so as to reach the position of Figure 4A: but in this position the hexagonal socket 6 is rotated by $\gamma'' = 30°$ relative to its initial position, and therefore can be fitted again on the head of screw B although space V allowed only a limited screwing or unscrewing rotation of screw B. The sequence of steps of Figures 4A-4C can be repeated more times, as much as it is sufficient for screwing or unscrewing the screw, the nut or other mechanical fastening elements B.

[0036] In other words, thanks to the skew position (neither perpendicular nor parallel) of pivoting axis AC relative the fitting direction AS of the hexagonal socket 6 and the axis

[0037] AS' of screwing/unscrewing of the screw or nut to be screwed/unscrewed, and with a suitable choice of the inclination angle α between pivoting axis AC and engagement axis AS is possible to provide a tool 1 that has at least two stable or however predetermined folded positions, where the angular positions of the hexagonal socket 6 - or other engagement portions 6 - relative the engagement axis AS in the two stable or however predetermined folded positions are displaced each from the other by a desired displacement angle γ''.

[0038] The displacement angle γ'' is a function both of the inclination angle α and of the angle θ (Figure 3) by which the driven element 5 must rotate around the pivoting axis AC so as to pass from a stable folded position -or however from a predetermined position- to the other. In the embodiment of Figure 2, in which it is θ = approximately 180°, it is $\alpha = \gamma''/2$

[0039] An advantage of such solution is that, unlike a double hexagon socket, allows making tools 1 for screwing and unscrewing mechanical fastening elements - such as screws or nuts- arranged in places not easy to be reached, said tools 1 being provided with engagement portions having not only hexagonal -like the hexagonal socket 6 - or polygonal shape, but having also any shape - for example with cross-, Torx- or generally multilobed fitting portions.

[0040] Moreover the present invention allows to make tools having generally engagement portions with simpler and compact shapes, and therefore - using for example same materials and heat treatments- less subject to wear and able to transmit greater screwing/unscrewing torques; this can be observed for example in the comparison with a double hexagon socket tool: a tool 1 for unscrewing hexagonal head (male) screws according to the present invention can be made with a simple hexagonal socket, which is less subject to wear deterioration in comparison with a twelve apex bi-hexagonal socket.

[0041] Analogously a tool 1 according to the present invention for unscrewing square socket can be made with a simple male engagement portion having square cross-section (square bit), less subject to wear deterioration in comparison with a eight apex socket.

[0042] Returning to the embodiment of Figure 2, articulation 4 can be made interposing a fin, or however a more or less flattened prolongation 41 of shank 3 between two fins or however lateral prolongations 42 resp. of driven element 5. An advantage of such solution, in comparison with making articulation 4 by interposing a fin of driven element 5 between two fins of the shank 3, is that this way in some applications more space is available for arranging the ball 52 and spring 53.

[0043] Moreover in the articulation the ends 4 of shank 3 and of the driven element 5 are coupled at their tops with substantially not spherical surfaces 50, 51. These surfaces 50, 51, and in particular their edges, can be shaped so as to rest one against the other when the tool is stresses because is applying a torque, in particular

when it is folded elbow-wise for transmitting greater unscrewing/screwing torques. This way part of the stresses that the shank 3 and the driven element 5 exchange with each other is transmitted through the contact zones of the top surfaces 50, 51 of the two elements of joint 4, and/or through the edges of such surfaces, so avoiding that these stresses are concentrated in the prolongations 41 and 42 and on the pin 7.

[0044] Like shown in Figure 2, tool 1 can comprise suitable means for reversibly blocking the rotation of articulation 4 in at least a predetermined stable position:

in the embodiment of Figure 2 such means comprise 52 sphere and spring 53 that pushes il against prolongation 42.

[0045] On prolongation 42 suitable notches or hollows (not shown) arranged in such way that sphere 52, partially fitted therein, blocks the rotation of driven element 5 in a number of relatively stable positions, for example in the positions of conditions I, II, III of Figure 3.

[0046] However the advantage of providing such snap blocking system, or however such reversible blocking means, has to be assessed with regard to the particular kind of tool to be made. In some cases they could be convenient, in others - for example for rapidly performing the movement sequence shown in Figures 4A-4C- they could

be instead preferably absent, so as to be able to execute the movements more rapidly. In other cases it could be convenient to provide means of reversible blocking that can be connected or disconnected at user's option.

[0047] Figure 5 shows a second embodiment of a tool according to the present invention

In the tool 100 of Figure 6, unlike tool 1 of Figure 2, the articulation 140 is made by coupling the ends of shank 103 and of driven element 105 with a pin 107 without interposing - like in the tool of Figure 2 - a more or less flattened prolongation 41 of shank 3 or of the driven element 5 respectively between two lateral prolongations 42 of the driven element 5 or of the shank 3 respectively (Figure 2), but by overlapping a single prolongation 141 of driven element 105 with a single prolongation of shank 103.

[0048] Moreover the two prolongations 141 and 142 are preferably in contact with each other on two respective flat surfaces 143, 144, trasversal to the pivoting axis 107. Moreover along the external curved edges - or at least on a large part of such edges- of prolongations 141, 142 two ring-like protrusions 145, 146 are provided.

[0049] This way prolongations 141, 142 can be designed more massive and robust than prolongations 41, 42 of Figure 2, and the stresses that the driven element 105 and the shank 103 apply to each other while using the tool 100 can be transmitted through the wide surfaces 143, 144, and above all through the ring-like protrusions 145, 146 and seats thereof provided respectively on the shank 103 and on the driven element 105, so that the stresses on pin 107 are reduced. This contributes to increase the duration and the strenght of tool 100.

[0050] Figure 6 concerns a third embodiment of a tool according to the present invention. In that embodiment the ends of shank 203 and of the driven element 205 are coupled with an abuttment with the substantially spherical surfaces 250, 251. These surfaces 250, 251, and in particular their edges, can be shaped so as to rest against each other when the tool is stressed because it applies a torque, in particular when it is folded elbow-wise for applying the maximum unscrewing/screwing torques. This way part of the stresses that the shank 203 and the driven element 205 apply to each other are transmitted through the contact zones of the butt surfaces 250, 251 of the two elements of joint 204, and/or through the edges of these surfaces, avoiding that such stresses are concentrated on prolongations 241, 242 and on the axis 207.

[0051] The substantially spherical end surfaces 250, 251 provide several -and in some cases more- possibilities, in comparison with the substantially non-spherical surfaces 50, 51 of the embodiment of Figure 2, for providing a shank 203 and a driven element 205 with zones of reciprocal support, at least when tool 200 applies high screwing/unscrewing torques.

[0052] The embodiments previously described are susceptible of various modifications and variations without departing from the scope of the present invention.

[0053] For example, the hexagonal socket 6 can be replaced more generally with a engagement portion 6 - said, in the present description, "first engagement portion 6" - suitable for engaging not only with a nut or screw B but more generally with a mechanical fastening element B suitable for being blocked/ unblocked, or closed/open, or tightened/loosened, or applied/removed by being rotated around one of its axes AS'.

[0054] The engagement portion 6 present on the driven element 5 may be for example a socket or a bit, and/or may be suitable for engaging with the mechanical fastening element B by fitting on the latter with a displacement parallel to the engagement axis AS.

[0055] Preferably but not necessarily the first engagement portion 6 comprises at least a portion having substantially a radial symmetry shape relative the engagement axis AS.

[0056] Preferably but not necessarily the first engagement portion 6 is suitable for engaging with a second corresponding engagement portion made on the mechanical fastening element B - in the example of Figure 2, the hexagonal head of screw B- where the second engagement portion has substantially a radial symmetry shape relative the engagement axis AS, AS'. For example the first engagement portion 6 of the driven element 5, or the second engagement portion of the mechanical fastening element B may define a substantially pyramidal, conical or prismatic shape - be it male or female with triangular, square, rectangular, pentagonal, hexagonal cross-section, generally polygonal, cross-, double hexagon-, multilobed, Torx-type cross section etc.

[0057] Preferably the inclination angle α between the engagement AC and the pivoting axis AS is comprised between 0° and 45°. More preferably such angle to is comprised between 0° and 30° or, even more preferably, between 0° and 20°.

[0058] Alternatively the inclination angle α may be comprised between 0° and 360°/(4N) (degrees), where N is the number of equal or substantially similar sectors -of the first engagement portion 6 of the driven element 5, or of the second engagement portion of the mechanical fastening element B- set around one of their radial symmetry axis AS, AS'. In the case of Figure 2, is N=6; however can N generally assume the values of 1,2,3,4,5,6,7,8 or a whichever integer value.

[0059] Alternatively the inclination angle α may be comprised between 0° and 360°/(2N) (degrees).

[0060] The driven element 5 may comprise a bushing or a pivot whose axis is substantially parallel to the engagement axis AS.

[0061] At least one out of driving element 5 and the driven element 3 may comprise or define a shaft, a pin (slim or squat), a lever or a connecting rod.

[0062] At least one out of the driving element and the driven element 5 may have substantially oblong shape, and articulation 4 can be fixed in proximity of or at an end of the at least one oblong element.

[0063] The articulation 4 can be suitable for allowing to align engagement axis AS and driving element 5, or however to make parallel the two elements.

[0064] In a preferred embodiment the articulation 4 is suitable for folding so as to allow the driving element 3 and the driven element 5 to form substantially a 90° elbow or however an L-shaped elbow (for example relative to the axes of the driving element 3 and of driven element 5 -Figure 3).

[0065] Preferably but not necessarily the articulation 4 is suitable for folding so as to allow the driving 3 and driven element 5 to form an elbow in at least two configurations, wherein in order to pass from the first (I) to second (III) of such elbow configurations the driving element 3 and the driven element 5 respectively rotate one relative the other around the pivoting axis AC clockwise or counter-clockwise, and in order to reach the second one of such elbow configurations (III) from the first one (I) the driving 3 and driven element 5 rotate one relative the other around the pivoting axis AC counter-clockwise or clockwise respectively, crossing in both movements an intermediate configuration (II) in which the articulation 4 is more extended and the driven and driving elements are substantially aligned with each other (Figures 2, 3B, 5, 6).

[0066] Preferably the articulation 4 is suitable for allowing the driven element 5 to be rotated relative the driving element 3 around the pivoting axis AC by at least 180°.

[0067] In some preferred embodiments the driven element 5, or however the part of tool 1 driven by the articulation 4 is substantially not longer than half of the length of the assembly handle 2 + shank 3, or however of the part of tool driving the articulation 4.

[0068] However the present invention may be used for manufacturing wrenches wherein the part of tool 1 driven by articulation 4 is much longer than the part driving the articulation; in such case the movement sequence for using the tool must - and can be- suitably adapted, for quickly unscrewing screws and nuts arranged in positions not easy accessible.

Claims

1. Tool (1) comprising:

- a driving element (3);
- a driven element (5) comprising engagement means suitable to be engaged in a predetermined position with a mechanical fastening element (B) so as to rotate or to apply a torque around a predetermined engagement axis (AS) to said mechanical fastening element (B);
- an articulation (4) connecting the driving element (3) and the driven element (5) so as to allow the driven element (5) to be driven by the driving element (3) and to rotate the mechanical fastening element (B) around to the engagement axis (AS), **characterised in that** the articulation (4) is suitable for allowing the driving (3) and driven element (5) to rotate one relative the other around a pivoting axis (AC), wherein the engagement (AS) and pivoting axes (AC) are skew and substantially not perpendicular with each other.

2. Tool (1) according to claim 1, wherein the engagement means comprise a first engagement portion (6) suitable for engaging, through one or more male/female couplings, with the mechanical fastening element (B) fitting with the latter with a displacement in a direction parallel to the engagement axis (AS).

3. Tool according to claim 2, wherein the first engagement portion (6) comprises at least a portion having substantially a radial symmetry shape relative to the engagement axis (AS).

4. Tool according to claim 2 and/or 3, wherein the first engagement portion (6) is suitable for to engaging with a second corresponding engagement portion provided on the mechanical fastening element (B), the second engagement portion having substantially a radial symmetry shape relative to the engagement axis (AS, AS'):

5. Tool according to claim 2 and/or 3, **characterised in that** the first engagement portion (6) of the driven element (5), or the second engagement portion of

the mechanical fastening element (B) defines a socket and/or a male bit having substantially conical, pyramidal or prismatic shape, and having at least one of the following cross-section shapes: triangular, square, rectangular, pentagonal, hexagonal, generally polygonal, cross-shaped, star-shaped, double hexagon-shaped, multilobed, Torx-like shaped.

6. Tool according to one or more preceding claims, **characterised in that** the inclination angle (α) between engagement (AS) and pivoting axes (AC) ranges between 0° and 45°.

7. Tool according to one or more preceding claims, **characterised in that** inclination angle (α) between engagement (AS) and pivoting axes (AC) ranges between 0° and 360°/(4N), wherein N is the number of equal or substantially similar sectors of the first engagement portion (6) of the driven element (5), or of the second engagement portion of the mechanical fastening element (B), set around its or one of their radial symmetry axis (AS, AS').

8. Tool (1) according to one or more preceding claims, **characterised in that** the articulation (4) is suitable for being folded so as to allow the driving (3) and driven element (5) to form substantially an L-shaped elbow.

9. Tool according to one or more preceding claims, **characterised in that** the articulation (4) is suitable for being folded so as to allow the driving (3) and driven element (5) to form an elbow in at least two configurations, wherein in order to pass from the first (I) to the second (III) of said elbow configurations the driving (3) and driven element (5) rotate one relative the other around the pivoting axis (AC) clockwise or counter-clockwise respectively, and in order to reach the second one of said elbow configurations (III) from the first one (I) the driving (3) and driven element (5) rotate one relative the other around the pivoting axis (AC) counter-clockwise or clockwise, crossing in both movements an intermediate configuration (II) in which the articulation (4) is more extended and/or the driving (3) and driven element (5) are substantially aligned to each other.

10. Method for using a tool (1) having the features according to one or more preceding claims, **characterised by** comprising the following steps:

- engaging the engagement means of the driven element (5) with a mechanical fastening element (B), with the articulation (4) in a first folded position (I, III);
- rotating the mechanical fastening element (B) with the tool (1) by a predetermined angle around the engagement axis (AS, AS');
- disconnecting the engagement means of the driven element (5) from the mechanical fastening element;
- bringing the articulation (4) in a second folded angular position (III, I), by rotating the driven element (5) around the pivoting axis (AC);
- rotating the driven element (5) around the engagement axis (AS);
- engaging at least a second time the engagement means of the driven element (5) with a mechanical fastening element (B).

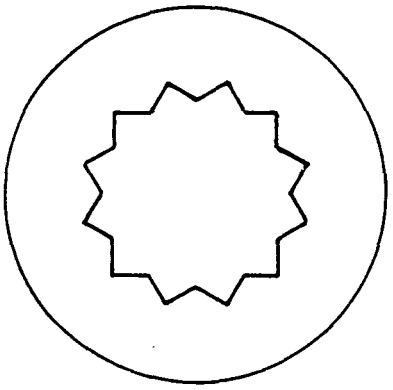


Fig. 1

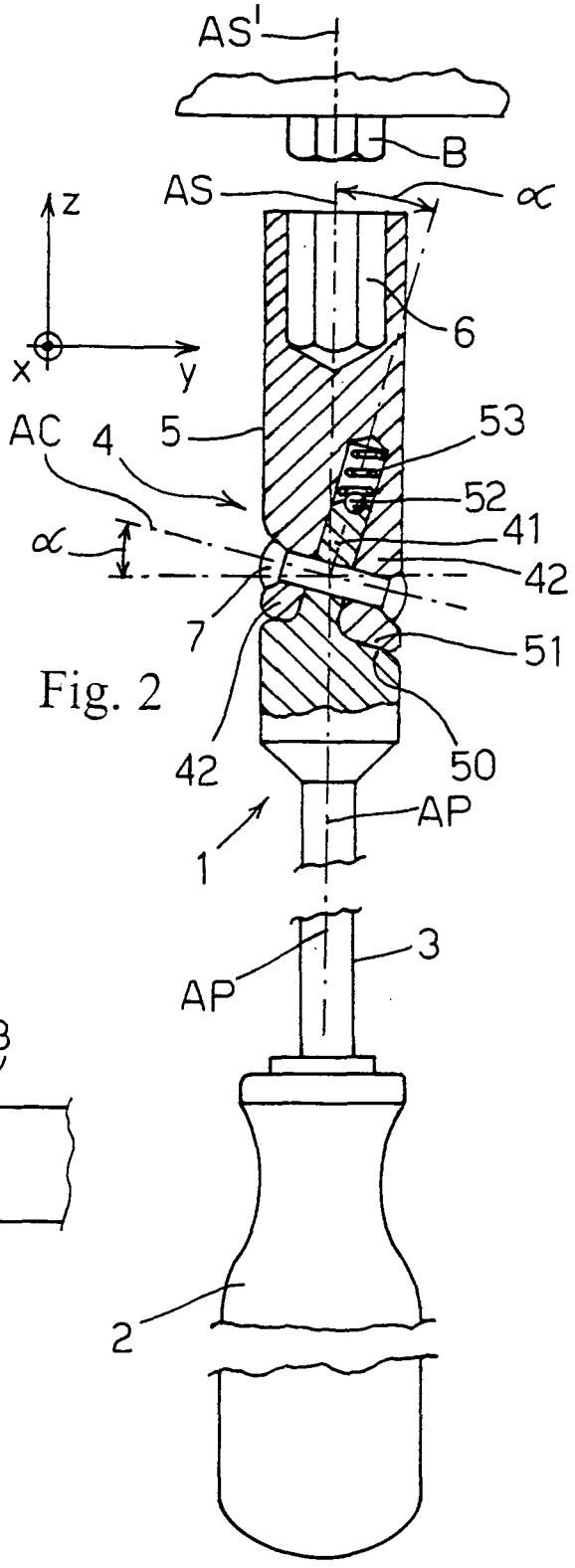


Fig. 2

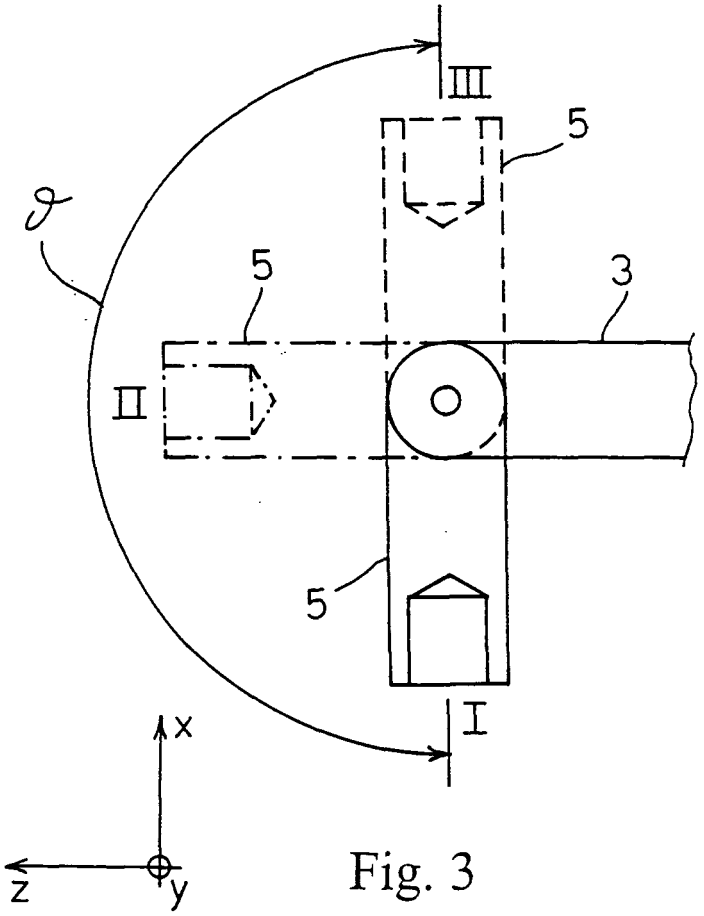


Fig. 3

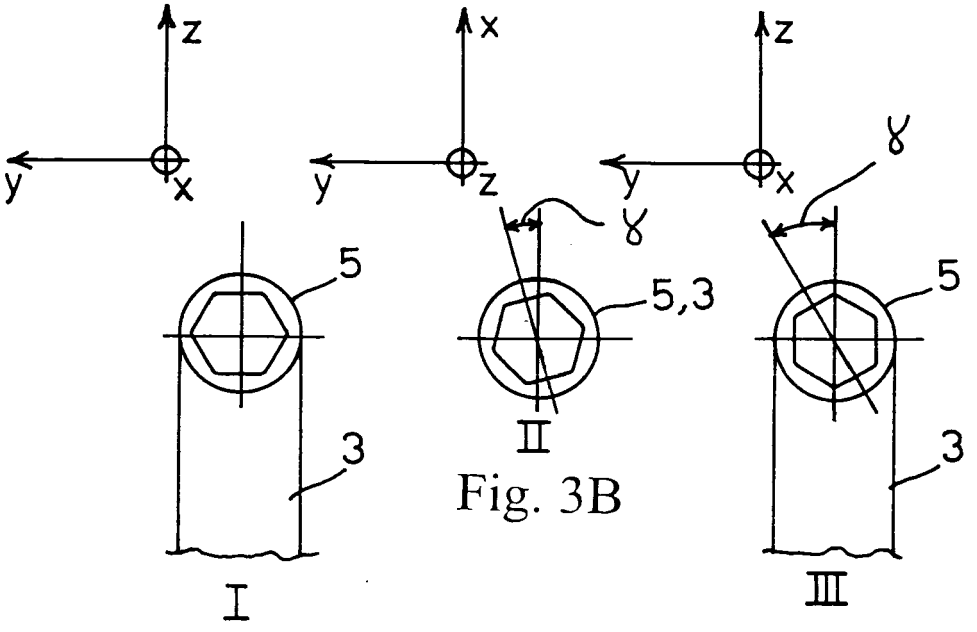
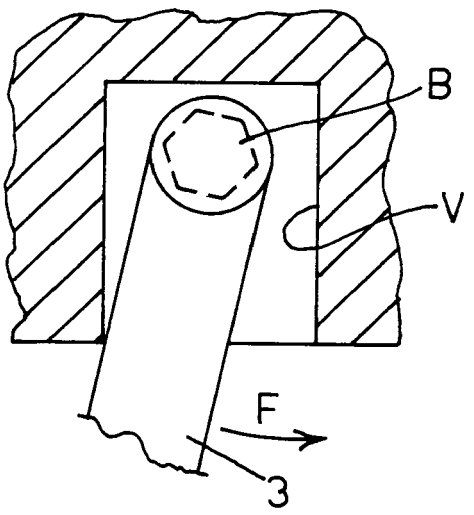


Fig. 3A

Fig. 3B

Fig. 3C



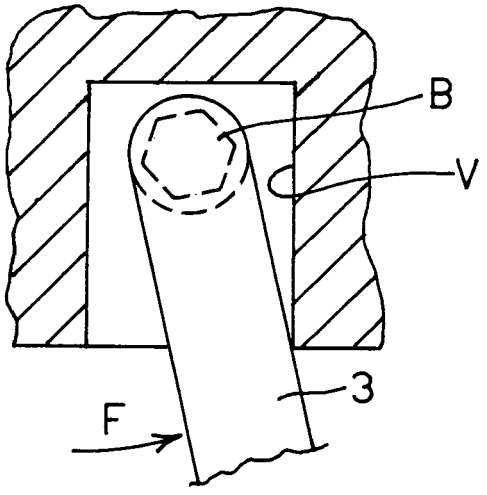


Fig. 4A

Fig. 4B

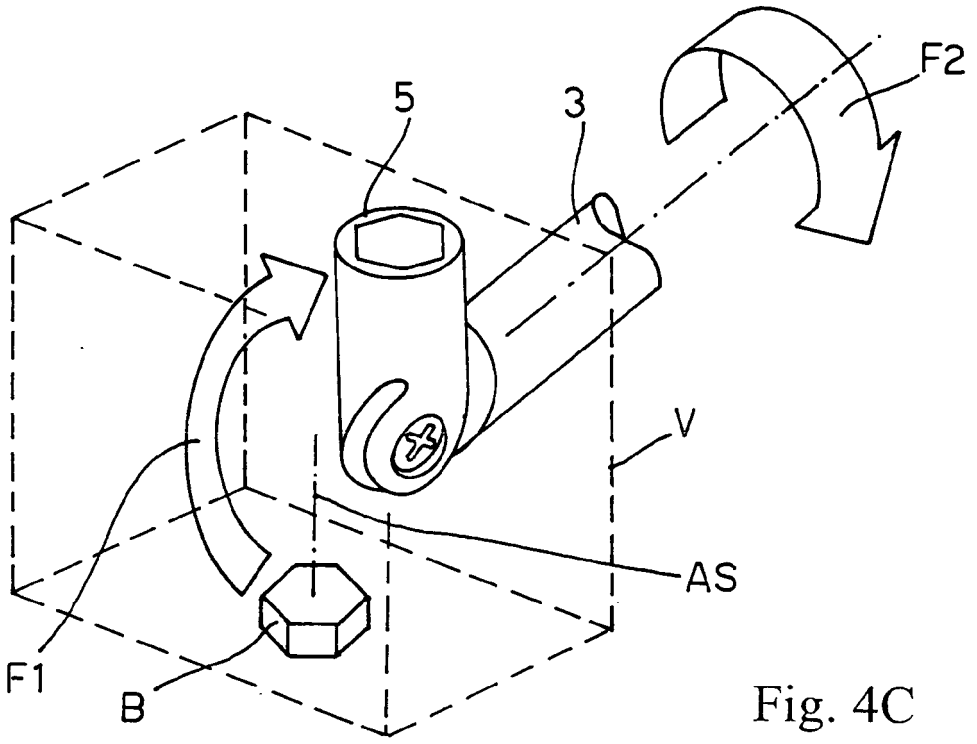


Fig. 4C

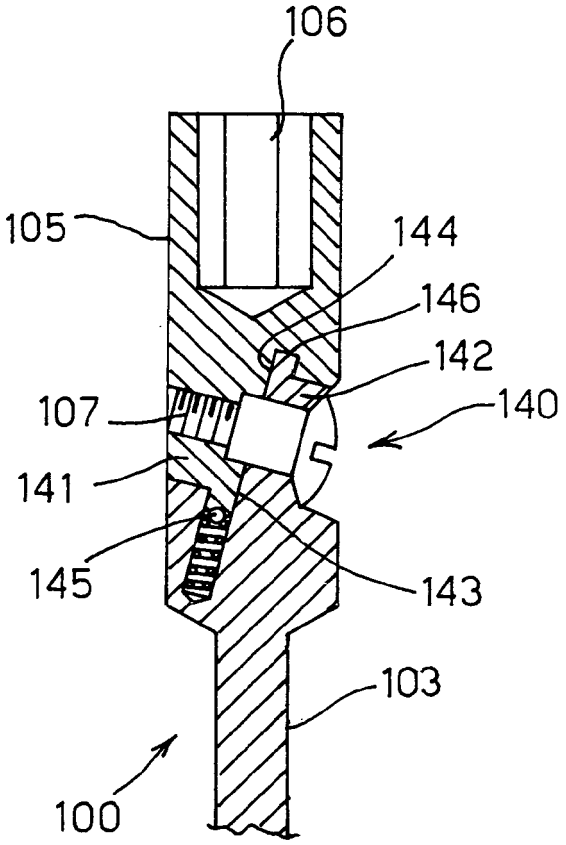


Fig. 5

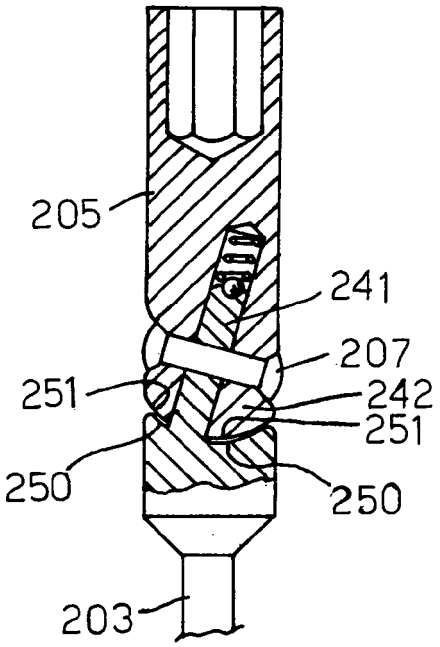


Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5251

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B25B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 September 2005	Kühn, T

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