

(19)



(11)

EP 3 307 485 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:

16.12.2020 Bulletin 2020/51

(51) Int Cl.:

B25B 13/06 (2006.01)

B25B 23/00 (2006.01)

(86) International application number:

PCT/EP2015/063069

(21) Application number: **15728003.3**

(22) Date of filing: **11.06.2015**

(87) International publication number:

WO 2016/198115 (15.12.2016 Gazette 2016/50)

(54) **NUT SOCKET UNIT FOR POWER WRENCHES**

MUTTERSTECKEINHEIT FÜR SCHRAUBENMASCHINEN

UNITÉ DE DOUILLE D'ÉCROU POUR BOULONNEUSES MÉCANIQUES

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(74) Representative: **Tholin, Thomas**

**Atlas Copco Industrial Technique AB
Patent Department
105 23 Stockholm (SE)**

(43) Date of publication of application:

18.04.2018 Bulletin 2018/16

(56) References cited:

WO-A1-01/70465

CN-U- 201 493 787

JP-A- H10 113 829

JP-A- 2008 142 794

US-A1- 2015 151 412

(73) Proprietor: **Atlas Copco Industrial Technique AB
105 23 Stockholm (SE)**

(72) Inventor: **DUBS, Alexander**

45279 Essen (DE)

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The invention relates to a nut socket unit to be attached to a power wrench and including an arresting means for locking the nut socket unit to the output shaft of the power wrench.

[0002] A well-known standard type of nut socket has a square cross sectional recess at its rear end intended for receiving the square shaped end portion of a power wrench output shaft. At its front end the nut socket has an internal cross sectional shape adapted to fit the type of screw joint to be tightened, for instance a hexagonal shape. The nut socket is also provided with an arresting means for locking the nut socket to the output shaft of the power wrench. This arresting means could be of different types but is normally shiftable between a locking position and a release position by means of an external maneuver sleeve.

[0003] A problem concerned with this previous type of nut sockets is that the maneuver sleeve is co-rotating with the nut socket and may constitute a risk for injuries on the part of the operator. Also the front part of the nut socket protruding in front of the maneuver sleeve may constitute a potential risk for injuries, for instance in case of an operator glove being tangled between the nut socket and the working object.

[0004] JPH10113829A discloses a tightening socket comprising a socket body, elastically fitted with a cover molded from a resin and secured to the socket body so as to be rotatable to prevent a workpiece from being damaged when tightening nuts or the like.

[0005] JP2008142794A discloses a fastening tool preventing a fastening object from being damaged, having a socket and a resin-made cover rotatable relatively and freely for the socket.

[0006] CN201493787U discloses a sleeve for avoiding damaging the mounting surfaces of the bolt and the nut or inner wall surfaces possibly in contact with the sleeve during the operation process. The sleeve comprise a sleeve body and an elastic protective sleeve arranged on the outer side of the sleeve body separated by a clearance from the sleeve body.

[0007] It is an object of the invention to avoid the above safety problem by providing an improved nut socket unit comprising a rotatable nut socket body and an external sleeve element that is freely rotatable relative to the nut socket body.

[0008] It is a further object of the invention to provide a nut socket unit including a rotatable nut socket body and an arresting means for connection of the nut socket body to an output shaft of a power wrench, wherein the arresting means comprises an external maneuver sleeve which is freely rotatable relative to the nut socket body for avoiding injury problems.

[0009] These objects are achieved with a nut socket according to claim 1.

[0010] Still further objects and advantages of the invention will appear from the following specification and

claims.

[0011] A preferred embodiment of the invention is described below in detail with reference to the accompanying drawing.

[0012] In the drawing

Fig. 1 shows a longitudinal section of a nut socket unit according to one embodiment of the invention illustrating the arresting means in its locked position..

Fig. 2 shows a rear end view of the nut socket unit in Fig. 1.

Fig.3 shows a front end view of the nut socket unit in Fig. 1.

Fig. 4 shows a side view, partly in section, of a nut socket unit according to an alternative embodiment of the invention.

Fig. 5 shows a rear end view of the nut socket unit in Fig. 4.

Fig. 6 shows a front end view of the nut socket unit in Fig. 4.

[0013] The nut socket unit illustrated in Figs 1-4 comprises a tubular socket body 10 having a rear end portion 11 including a recess 12 of square cross section for receiving a square end of a power wrench output shaft. The socket body 10 is formed with a front end portion 13 having a hexagonal recess 14 for engagement with the hexagonal head or nut of a screw joint to be tightened.

[0014] In the rear end portion 11 of the socket body 10 there is provided an arresting mechanism 15 for locking the nut socket unit to an output shaft of a power wrench. This arresting mechanism 15 comprises a number of balls 16 received in lateral apertures 18 in the socket body 10 and intended to cooperate with the output shaft of a power wrench to lock the nut socket unit to that shaft. A maneuver sleeve 19 is axially displaceable on the outside of the socket body 10 between a lock position in which the balls 16 are retained in their inner positions accomplishing a locking engagement with a power wrench output shaft, and a release position in which the balls 16 are free to move radially outwardly to release the nut socket unit from the power wrench output shaft. At its rear end the maneuver sleeve 19 is provided with an inner annular recess 20 which is intended to enable the outward release movement of the balls 16 as the maneuver sleeve 19 occupies its forward most position, i.e. the release position. In that position of the maneuver sleeve 19 and the balls 16 the nut socket unit is free to be disconnected from a power wrench output shaft. For obtaining an improved grip on the maneuver sleeve 19 it is provided with an outer sleeve 21, preferably made of a plastic material and provided with a friction enhancing pattern on its envelope surface.

[0015] A number springs 22 are provided between the maneuver sleeve 19 and a support ring 23 on the socket body 10 so as to exert a bias force on the maneuver sleeve 19 in the ball locking direction of the latter. The support ring 23 is freely rotatable on the socket body 10

and is axially backed by a lock ring 25 mounted in a circumferential groove 26 in the socket body 19. The springs 22 are received in bores 24 in the maneuver sleeve 19 which means that the springs 22 are positively locked relative to the maneuver sleeve 19 for co-rotation with the latter. The lock ring 25 has an outer diameter that is small enough to permit the maneuver sleeve 19 to pass on its outside when displaced from its rear lock position to its forward release position.

[0016] To shift the arresting mechanism 15 from its lock position, as illustrated in Fig. 1, to its release position the maneuver sleeve 19 has to be pushed in a forward direction against the bias force of the springs 22, thereby permitting the balls 16 to be displaced outwardly into the annular recess 20 in the maneuver sleeve 19 to thereby release the nut socket unit from a power wrench output shaft.

[0017] By arranging the maneuver sleeve 19 with its outer sleeve 21 freely rotatable relative to the socket body 19 the operator is protected from getting injured due to for instance a glove being tangled between the nut socket unit and a work piece during screw joint tightening operations.

[0018] The front end portion 13 of the socket body 10 may be of different lengths depending on the type of screw joint to be tightened, and in case of an extended front end portion 13 in particular there would be a risk for injuries of the same kind as the with the maneuver sleeve 19, namely tangling of an operators glove. In order to prevent such injury risks the front end portion 13 of the socket body 10 is provided with a freely rotatable protection sleeve 30. This protection sleeve 30 is axially locked relative to the socket body 10 by an inner circumferential ridge 31 in engagement with a circumferential groove 32 in the socket body 10.

[0019] The protective sleeve 30 is preferably made of a plastic material (e.g. POM) having a relatively low friction coefficient to facilitate easy relative movement between the sleeve 19,30 and the socket body 10, and is axially locked to the socket body 10 in that the inner ridge 31 snaps into the groove 32 via an elastic deformation of the sleeve 30 when mounted on the socket body 10.

[0020] In the embodiment of the invention illustrated in Figs 4-6, a tubular socket body 50 has a forward end portion 53 formed with a polygonal recess 54 for engagement with a screw joint having identically shaped parts. At its rear end portion 51 of the socket body 50 is provided with a recess 52 of square cross section for receiving a square end of a power wrench. At the rear end of the socket body 50 there is also provided an arresting mechanism 55 for locking the nut socket unit to an output shaft of a power wrench. This arresting mechanism 55 comprises a removable lock pin 56 which extends radially relative to the socket body 50 when inserted in the nut socket unit. The lock pin 56 has a length about the same as the outer diameter of the rear end portion 51 of the socket body 50 and extends in its inserted position into two opposite apertures 57,58 in the socket body 50. The

lock pin 56 is intended to extend through a transverse bore in a power wrench output shaft to lock the nut socket unit to the power wrench. A maneuver sleeve 59 is axially displaceable on the outside of the socket body 50 between a rear lock position covering the apertures 57,58, thereby preventing the pin 56 from falling out, and a forward release position. At its rear end the maneuver sleeve 59 is provided with two oppositely located apertures 60,61 through which the lock pin 52 may be removed before attachment of the nut socket unit or at detachment of the nut socket unit from a power wrench output shaft. In the release position of the sleeve 59 the apertures 57,58 are uncovered and the lock pin 56 may be removed. Then, the nut socket unit may be detached from a power wrench output shaft. The maneuver sleeve 59 is preferably made of a plastic material.

[0021] For safety reasons the maneuver sleeve 59 is freely rotatable relative to the socket body 50, and a number of springs 62 are provided to bias the sleeve 59 toward its rear lock position. The springs 62 are evenly distributed along the periphery of the sleeve and act against a support ring 63 which is likewise freely rotatable relative to the socket body 50. The support ring 63 is backed by a lock ring 65 mounted in a circumferential groove 66 in the socket body 50. The maneuver sleeve 59 is provided with bores 64 for receiving and supporting a rear part of the springs 62, thereby making the springs 62 safely follow the maneuver sleeve 59 at rotation relative to the socket body 50.

[0022] Accordingly, for protecting the operator from injuries at screw joint tightening operations due for instance tangled gloves the maneuver sleeve 59 is freely rotatable relative to the socket body 50. However, there is still a safety risk related to the forwardly extending end portion 53 of the socket body 50 which rotates during screw joint tightening operations. To eliminate that risk a freely rotatable protective sleeve 70 is provided on the end portion 53. The protective sleeve 70 is axially locked relative to the socket body 50 by means of an inner circumferential ridge 71 engaging an annular groove 72 on the socket body 50.

[0023] The protective sleeve 70 carried on the front end portion 53 of the socket body 50 is preferably made of a plastic material (e.g. POM) having a relatively low friction coefficient to facilitate easy relative movement between the sleeve 59, 70 and the socket body 50, and is axially locked to the socket body 50 in that the inner ridge 71 snaps into the groove 72 via an elastic deformation of the sleeve 70 when mounted on the socket body 50.

[0024] It is to be noted that the invention is not limited to the above described examples but may be freely varied within the scope of the claims.

Claims

1. A nut socket unit for power wrenches, comprising a

tubular socket body (10;50) having a front end portion (13;53) adapted for engagement with a screw joint, and a rear end portion (11;51) for connection to the output shaft of a power wrench, wherein a freely rotatable sleeve (30;70) is provided on the outside of the front end portion (13;53) of the socket body (10;50) for operator protecting purpose, **characterized in that** an arresting mechanism (15;55) is provided for locking the socket body (10;50) to a power wrench output shaft, said arresting mechanism (15;55) includes a maneuver sleeve (19;59) axially displaceable on the outside of the rear end portion (11;51) of the socket body (10;50) and arranged for shifting said arresting mechanism (15;55) between a lock position and a release position, said maneuver sleeve (19;59) is freely rotatable relative to the socket body (10;50) for operator protective purpose.

2. Nut socket unit according to claim 1, wherein a number of springs (22;62) are provided between said maneuver sleeve (19;59) and the socket body (10;50) for biasing the maneuver sleeve (19;59) toward said lock position.
3. Nut socket unit according to anyone of claims 1-2, wherein said protective sleeve (30;70) is axially locked relative to said socket body front end portion (13;53) via an inner ridge (31;71) co-operating with a circumferential groove (32;72) on said socket body front end portion (13;53).
4. Nut socket unit according to claim 3, wherein said protective sleeve (30;70) consists of a plastic material and is elastically deformable at mounting on said socket body front end portion (13;53) for obtaining said locking co-operation between said inner ridge (31;71) and said circumferential groove (32;72).

Patentansprüche

1. Muttersteckschlüsseleinheit für Kraftschrauber, umfassend einen rohrförmigen Steckschlüsselkörper (10; 50), der einen vorderen Endabschnitt (13; 53), der für einen Eingriff mit einer Verschraubung geeignet ist, und einen hinteren Endabschnitt (11; 51) für eine Verbindung mit der Abtriebswelle eines Kraftschraubers aufweist, wobei eine frei drehbare Hülse (30; 70) an der Außenseite des vorderen Endabschnitts (13; 53) des Steckschlüsselkörpers (10; 50) zu Schutzzwecken eines Bedieners bereitgestellt ist, **dadurch gekennzeichnet, dass** ein Sperrmechanismus (15; 55) zum Verriegeln des Steckschlüsselkörpers (10; 50) einer Abtriebswelle des Kraftschraubers bereitgestellt ist, wobei der Sperrmechanismus (15; 55) eine Steuerhülse (19; 59) beinhaltet,

die an der Außenseite des hinteren Endabschnitts (11; 51) des Steckschlüsselkörpers (10; 50) axial verschiebbar und zum Verstellen des Sperrmechanismus (15; 55) zwischen einer Verriegelungsposition und einer Freigabeposition angeordnet ist, wobei die Steuerhülse (19; 59) zu Schutzzwecken des Bedieners relativ zu dem Steckschlüsselkörper (10; 50) frei drehbar ist.

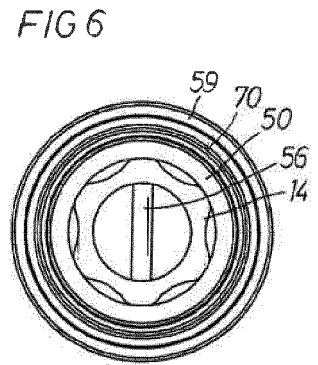
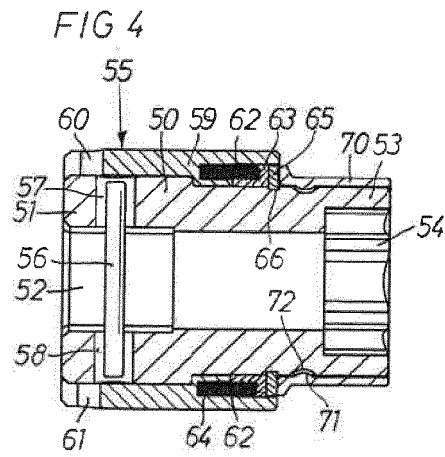
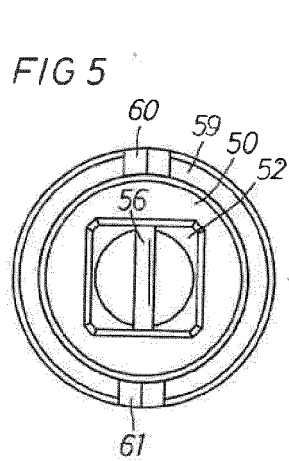
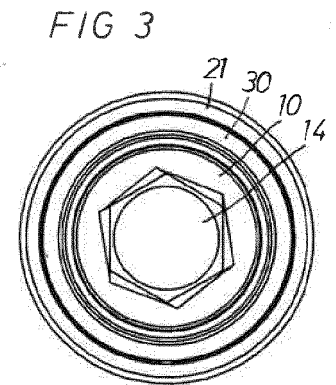
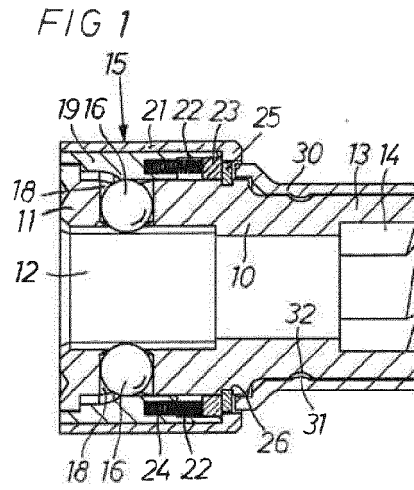
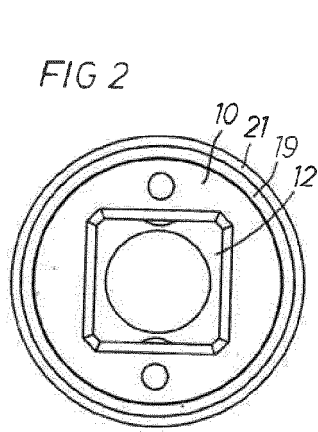
2. Muttersteckschlüsseleinheit nach Anspruch 1, wobei eine Anzahl von Federn (22; 62) zwischen der Steuerhülse (19; 59) und dem Steckschlüsselkörper (10; 50) zum Vorspannen der Steuerhülse (19; 59) zu der Verriegelungsposition hin bereitgestellt sind.
3. Muttersteckschlüsseleinheit nach einem der Ansprüche 1-2, wobei die Schutzhülse (30; 70) relativ zu dem vorderen Endabschnitt (13; 53) des Steckschlüsselkörpers über eine innere Wulst (31; 71) axial verriegelt ist, die mit einer Umfangsnut (32; 72) an dem vorderen Endabschnitt (13; 53) des Steckschlüsselkörpers zusammenwirkt.
4. Muttersteckschlüsseleinheit nach Anspruch 3, wobei die Schutzhülse (30; 70) aus einem Kunststoffmaterial besteht und beim Befestigen an dem vorderen Endabschnitt (13; 53) des Steckschlüsselkörpers elastisch verformbar ist, um das verriegelnde Zusammenwirken zwischen der inneren Wulst (31; 71) und der Umfangsnut (32; 72) zu erhalten.

Revendications

1. Unité de douille d'écrou pour boulonneuses, comprenant un corps de douille tubulaire (10 ; 50) ayant une partie d'extrémité avant (13 ; 53) adaptée pour entrer en prise avec un joint à vis, et une partie d'extrémité arrière (11 ; 51) pour la liaison à l'arbre de sortie d'une boulonneuse,

dans laquelle un manchon (30 ; 70) pouvant tourner librement est fourni sur l'extérieur de la partie d'extrémité avant (13 ; 53) du corps de douille (10 ; 50) afin de protéger l'opérateur, **caractérisée en ce qu'un** mécanisme d'arrêt (15 ; 55) est prévu pour verrouiller le corps de douille (10 ; 50) au niveau d'un arbre de sortie de boulonneuse, ledit mécanisme d'arrêt (15 ; 55) comportant un manchon de manœuvre (19 ; 59) déplaçable axialement à l'extérieur de la partie d'extrémité arrière (11 ; 51) du corps de douille (10 ; 50) et agencé pour déplacer ledit mécanisme d'arrêt (15 ; 55) d'une position de verrouillage à une position de desserrage, ledit manchon de manœuvre (19 ; 59) pouvant tourner librement par rapport au corps de douille (10 ; 50) afin de protéger l'opérateur.

2. Unité de douille d'écrou selon la revendication 1, dans laquelle un certain nombre de ressorts (22 ; 62) sont prévus entre ledit manchon de manœuvre (19 ; 59) et le corps de douille (10 ; 50) pour solliciter le manchon de manœuvre (19 ; 59) vers ladite position de verrouillage. 5
3. Unité de douille d'écrou selon l'une quelconque des revendications 1 à 2, dans laquelle ledit manchon protecteur (30 ; 70) est verrouillé axialement par rapport à ladite partie d'extrémité avant du corps de douille (13 ; 53) à l'aide d'une arête intérieure (31 ; 71) coopérant avec une gorge circonférentielle (32 ; 72) sur ladite partie d'extrémité avant du corps de douille (13 ; 53). 10 15
4. Unité de douille d'écrou selon la revendication 3, dans laquelle ledit manchon protecteur (30 ; 70) est constitué d'une matière plastique et est élastiquement déformable lors du montage sur ladite partie d'extrémité avant du corps de douille (13 ; 53) pour obtenir ladite coopération de verrouillage entre ladite arête intérieure (31 ; 71) et ladite gorge circonférentielle (32 ; 72). 20 25
- 30
- 35
- 40
- 45
- 50
- 55



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2008142794 A [0005]
- CN 201493787 U [0006]