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(72) Inventor; and
(71) Applicant : **SEIDLER, Manfred** [DE/DE]; Postweg 19, 41564 Kaarst (DE).

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— *with amended claims (Art. 19(1))*

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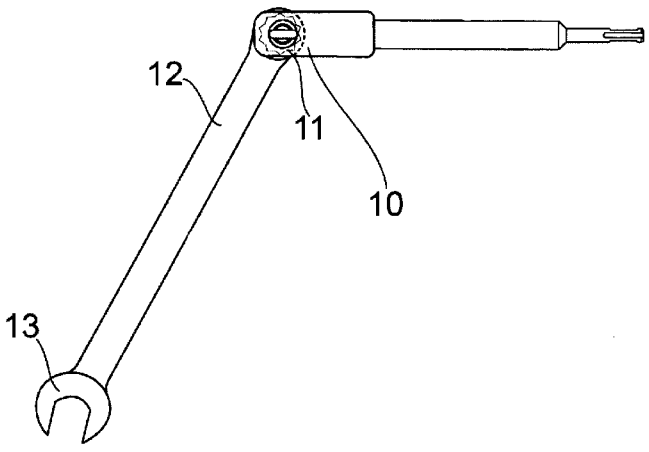
(54) **Title**: TOOL FOR TIGHTENING AND RELEASING SCREWS

Fig. 2



(57) **Abstract**: Tight Screws and nuts, even in badly accessible position, can be released or tightened using combination wrenches, when a percussion hammering into its box side is performed. Therefore of the axial movement of a hammer drill is transmitted to a wrench by an axis that fits into the drill's chuck, while its rotation is diverted in a swivel joint in between.

TOOL FOR TIGHTENING AND RELEASING SCREWS

FIELD OF THE INVENTION

The invention relates to a device for fixing and releasing screws in odd positions with an impact type of wrench system, more particularly with applying an impact source to conventional spanners.

PROBLEM TO BE SOLVED

Effective fastening and dismantling screws is best performed with air-hydraulic impact wrenches, widely applied on lug and wheel nuts, where reliable fit has to be combined with reasonable torque for fixing and releasing.

However, on machine brackets and fixtures these air-hydraulic tools are not applicable, since their nuts need to be driven directly from an air-hydraulic motor axis, whereas torque converters or mitre gears do not last long under percussive driving.

Moreover, quite a few screw heads and nuts are concealed by other machine parts and thus hardly accessible, except with a flat spanner.

ASSIGNMENT OF TASK

It therefore is the task of the here disclosed invention to release or fasten these screws or nuts with less effort and risk of breaking the assembly.

PRIOR ART

A quite large number of patents and patent applications refere to impact driving fastening devices, as found in JP2001-129767, US 4.186.701 and many other constructions of electrical or pneumatic/hydraulically driven impact wrenches.

However, all these instruments refer to driving the screw or bolt in axis without the application of the leaverage from a wrench or spanner and therefore are hardly applicable at screws or nuts, that are concealed by other elements.

There was, however, the invention from M.L.Williams in US 6.748.833 B2, which proposes a tool with a key for nuts, that may be driven by hammering on an impact surface of a hinged arm.

With this construction it is still hard work, whereas the most effective way to set or dismantle tight screws is to apply medium-frequence percussion on the fastening elements, that cannot be achieved with manual hammering. Furthermore, the key and nut system together with the

necessary thickness of the transmitting arm demands a clearing above the fastening element, that often enough is not given.

INVENTIVE STEP

The basic finding that leads to the here disclosed solution is, that you can drive a wrench efficiently, if you drill a bore into its flange shortly under the crank of its opposite open end and to press onto it with a pin tap on a rotating hammer drill.
Since this is not a well workable installation, the idea is to make a feasible toolset to work without manually holding the spanner and without taking care of the exact fit between pin and bore.

SUMMARY OF THE INVENTION

The wrench therefore is driven by a rod, that on one side is formed as an adaptor to be inserted into the chuck of a conventional rotary hammer drill.
The driving element to the wrench is a clevis bearing on the other end of the rod, that is connected to the shaft or the box part of the wrench, whereas the open end of said wrench is engaged with the screw or bolt that needs to be driven. Since in many cases the revolution of the driving hammer cannot be disengaged, it is absorbed within a pivot bearing in line with the shaft.

PREFERRED EMBODIMENT

In a preferred embodiment the wrench is a combination type (that means with one end open and the other end of box type) and the tool consists of a shaft, which on one side comprises an adaptor, that fits into the chuck of the driving means (preferably a SDS = special direct tool adaptor) system. In this SDS adaptor the drill bolting device and torque transmission in SDS is executed separately from each other to be almost wear-free. It works by means of two facing slots (semi-circle cross section), into which in each case one engages to an integrated ball in the bushing.

The opposite end of the shaft is mounted to a clevis bearing. That one may contain a splint, that fits through a bore in the shaft of the wrench. But since this requires some modification on different applicable wrenches, it preferably fits around the box end of the combination wrench, fastened therein with a strong bolt.

The shaft is decoupled from the rotating momentum of the hammer drill by splitting it and applying a pivot bearing between the two halves, preferably therefore a swivel-joint is directly mounted at the clevis bearing.

DESCRIPTION OF THE DRAWINGS

Fig. 1 in top view and **Fig. 2** in side view show the tool **1** for tightening and releasing screws with a hammer drill, consisting of a swivel connector **2** on a shaft **7** that ends in a SDS-type connector **8** to be inserted into the chuck of the hammer drill.
On the opposite side of swivel connector **2** a clevis bearing **10**, consisting of the flanges **15** and **16** encompasses the ring **11** of a combination wrench **12**, that preferably has an open-ended wrench element **13** on its other side, which is to be engaged into the nut or bolt, that must be driven. An eye bolt **14** is screwed through an bore on one flange **15** into a thread in the other flange **16** of the clevis to secure this connection.

Fig. 3 shows a longitudinal cut and **Fig. 4** a vertical cut of the connector section and demonstrates the swivel function: the fluted shaft **7** enters into the bore **3** of connector **2** to be supported by a ball bearing **4** and secured by holding pins **5** and **6** in his keyway **9**.

WHAT IS CLAIMED IS:

1. A tool for tightening and releasing screws with a hammer drill, comprising a shaft, which on one side is fixed in the hammer drill's chuck and the opposite end connected via a swivel joint to a clevis bearing, that fits to a wrench.

2. A tool for tightening and releasing screws as to claim 1, wherein the swivel bearing is directly mounted to the clevis bearing.

3. A tool for tightening and releasing screws as to claim 1 and 2, wherein the clevis bearing fits around the box part of a combination wrench.

4. A tool for tightening and releasing screws as to claim 3, wherein the box part of the wrench is fixed to the clevis with a strong bolt through the box opening.

5. A tool for tightening and releasing screws as to claim 4, wherein the bolt allows some axial clearance for hammering movement.

AMENDED CLAIMS
received by the International Bureau on 7 February 2013 (07.02.2013).

1. A device (auxiliary tool as per Pos. 2,7, and 8) for transforming the power-of-impact (linear function only be used) of a percussion drill with chisel-function or chipping hammer/drill hammer/rock drill (so called handling unit) onto a wrench, spanner or similar (standard or special execution) for releasing or tightening screws or nuts, even in positions which are difficult to access.

   The centre part of the device (Pos. 7) is formed as a round, hexagonal or similar bar.

   One end of this bar (Pos. 8) fits to the chuck of the percussion drill etc., the other end with a clevis (Pos.2) can be placed at any position at the shaft (gripping surface of a wrench or similar)

2. If necessary, the clevis can be fitted to a rotary bearing to allow the use of a rotating unit, such for example a percussion drill. (additional function of the CLAIMS to position 1).

3. If the clevis (Pos. 2) is engaged to the shaft of a wrench (Pos. 12), the clevis front-part (fork) exceeds the shaft. At its front, the clevis has a hole where a bolt or screw (Pos. 14) can be inserted. The clevis together with the inserted bolt or screw forms some kind of a flexible connection and prevents the wrench, etc. from falling down in case of loosing contact to the screw or nut to be loosen or tighten.

4. The bolt or screw (Pos. 14) can also be fixed through the box part (Pos. 11) of a ring spanner. This will result in a flexible joint.

5. The clevis fork part ends (Pos. 15 and 16) are V-shaped to the outside to ease the connection to the tool in question (such as a wrench, etc.) and to prevent of gliding/slipping off in case of a ratchet lever is engaged for work.

6. The percussion, generated by percussion of the handling unit sets the screw or nut into vibration , which will release existing locking corrosion or other particles in the thread of the screw or nut.

7. As the power-of-impact is applied straight through onto the shaft of the wrench (lever principe), the force needed by the operator (for instance serviceman) for releasing the screw or nut is significantly reduced - particularly in relation to the torque moment – which was used for the original tightening process.

8. The device can be used in connection with wrenches, etc.

9. The device extends and enlarges the range of applications for percussion drills (handling units) by proving the opportunity to loosen or tighten screws and nuts, particularly that are difficult to access.

Fig. 1

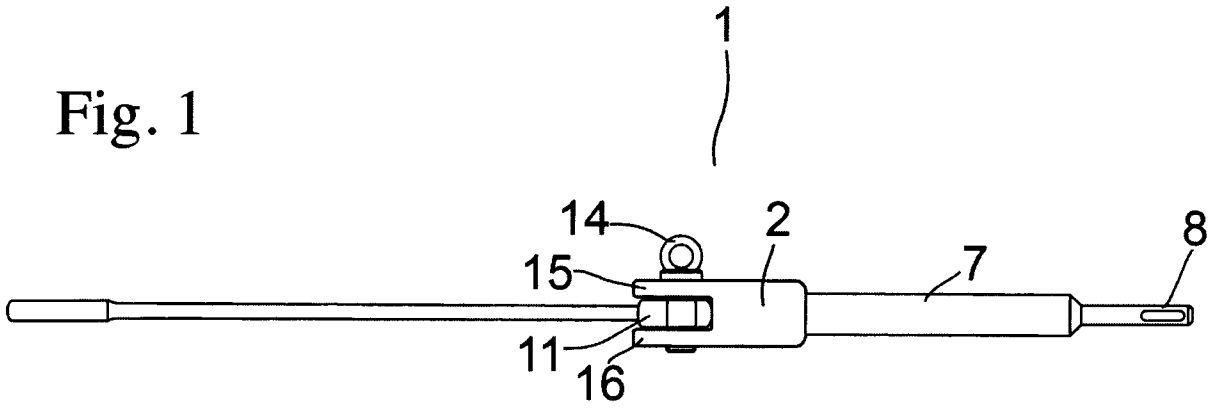


Fig. 2

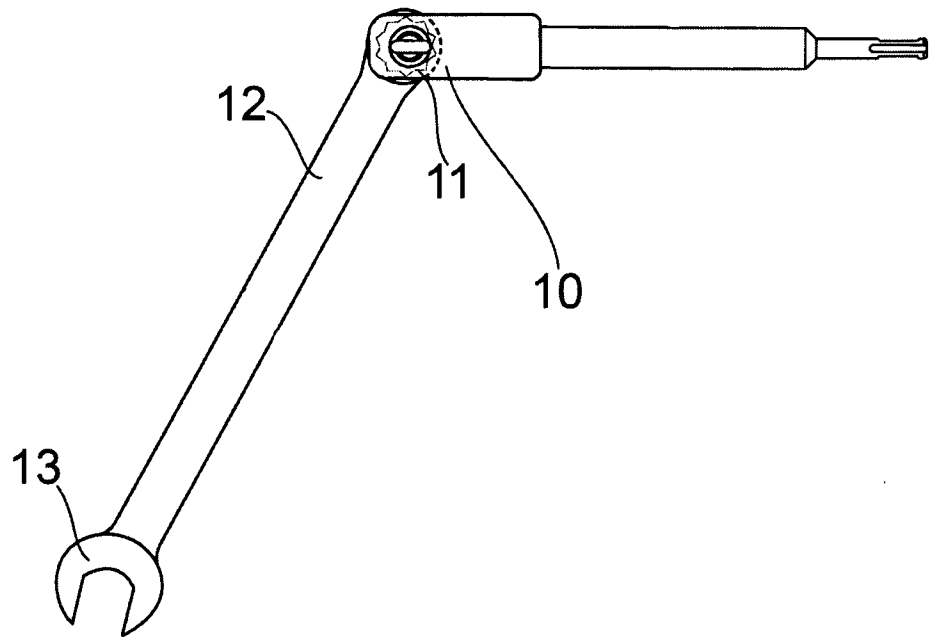


Fig. 3

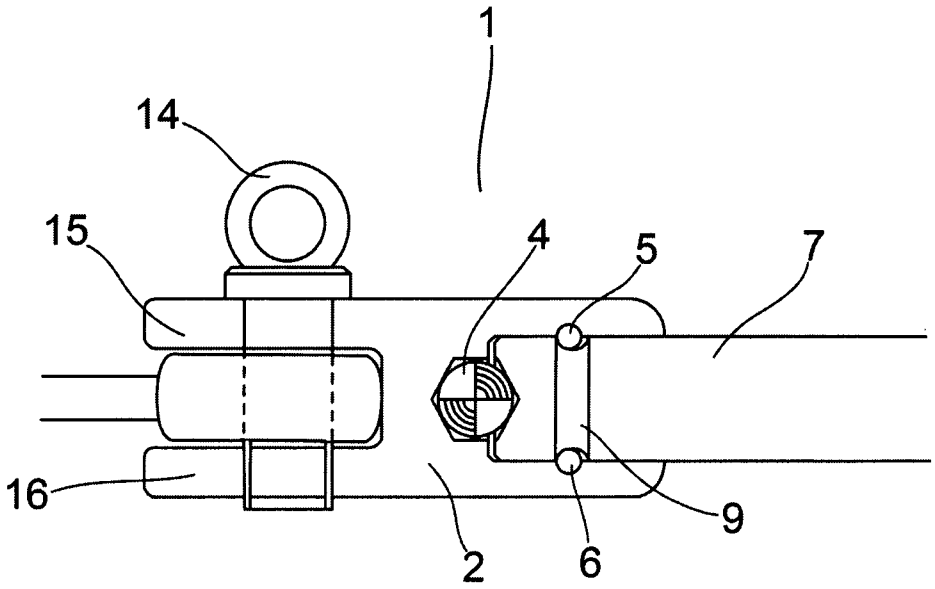
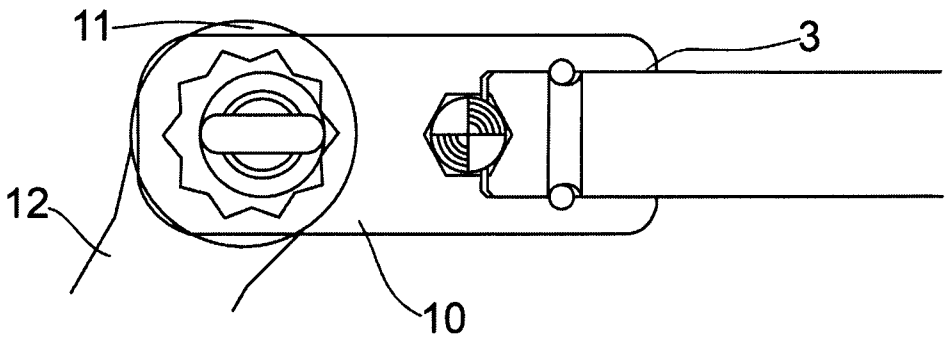


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. B25B13/48 B25B19/00 B25B23/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B25B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 20 2009 013378 U1 (SU CHENG WEI [TW]) 18 March 2010 (2010-03-18) the whole document	1-5
X	US 2011/005359 A1 (SU CHENG-WEI [TW]) 13 January 2011 (2011-01-13) the whole document	1-5
A	US 2002/162428 A1 (WILLIAMS MATTHEW LANCE [AU]) 7 November 2002 (2002-11-07) the whole document	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 November 2012	19/12/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Pothmann, Johannes

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202009013378 U1	18-03-2010	DE 202009013378 U1	18-03-2010
		TW 201024045 A	01-07-2010
		US 2010154604 A1	24-06-2010
US 2011005359 A1	13-01-2011	NONE	
US 2002162428 A1	07-11-2002	NONE	