

(19)



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Office européen des brevets



(11)

EP 0 504 331 B1

(12)

EUROPEAN PATENT SPECIFICATION

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

15.07.1998 Bulletin 1998/29

(21) Application number: **91908547.2**

(22) Date of filing: **19.04.1991**

(51) Int. Cl.⁶: **B25B 21/00**

(86) International application number:
PCT/US91/02795

(87) International publication number:
WO 92/05917 (16.04.1992 Gazette 1992/09)

(54) **FLUID-OPERATED WRENCH**

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CLEF ACTIONNEE PAR UN LIQUIDE

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(30) Priority: **08.10.1990 US 611168**

(43) Date of publication of application:
23.09.1992 Bulletin 1992/39

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Description

The present invention relates to fluid-operated wrenches of the type disclosed in the pre-characterising portion of the ensuing claim 1.

Hydraulic wrenches of the above-mentioned general type are known in the art. One such wrench is disclosed in my GB-A-2028204 which has a housing with a fluid-operated drive means and a ratchet turnably mounted in the housing and connected with the drive means to be turned. The ratchet is a one-way ratchet and has a first engaging means which is connected to the ratchet on one side of the housing to loosen a threaded connector and is connected to the ratchet on another side of the housing to tighten the threaded connector. A reaction means is provided to transfer a reaction force to a stationary object during the tightening or loosening, the reaction means of this reference being attached to the second housing portion which accommodates the fluid-operated drive.

Another known fluid-operated wrench is disclosed in my US-A-4707527. The wrench disclosed in this reference has a two-way ratchet which permits the retention of the tool on the threaded connector, regardless of whether the threaded connector is to be tightened or loosened. In my US-A-4846028 another wrench is disclosed which has a two-way ratchet and also an engaging element which turns one part of the threaded connector and the holding element which holds another part of the threaded connector during turning. In both these patent specifications, the ratchets and the reacting or holding element extend at one axial side of the ratchet. The two-way ratchets used in such tools necessitate further research and development simply because two-way ratchets as they are commonly known frequently cannot be subjected to high force output of many fluid-operated torque wrenches. It is believed to be clear that further improvements of the existing tools would be desirable.

It is an object of the present invention to provide a fluid operated tool which avoids the disadvantages of the prior art.

More particularly, it is an object of the present invention to provide such a fluid-operated tool which has to be turned around when switching from the tightening process of the threaded connector to the loosening process of the same and which also has a reaction member attached around a drive axis of the ratchet.

In keeping with these objects and with others which will become apparent hereinafter, there is provided a fluid-operated wrench as claimed in the ensuing claim 1.

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

Figure 1 is a view showing schematically a fluid-operated tool in accordance with the present inven-

tion;

Figure 2 is a view showing a fluid-operated tool in accordance with an embodiment of the present invention; and

Figure 3 is a view showing a retaining element of the inventive fluid-operated tool.

A fluid-operated wrench in accordance with the present invention has a fluid-operated drive 1. The drive includes, as is known, a cylinder 2 (forming a rear portion of the housing) and a piston 3 movable in the cylinder 2 and provided with a piston rod 4. Two side plates 43 which form a front portion of the housing are connected in a known manner with the cylinder 2 of the drive and form together with the cylinder a housing of the tool.

The fluid operated tool further has a ratchet-pawl mechanism which includes a ratchet 44 (see Figure 2) having an axis and a pawl 41 engaging the ratchet through interengaging formations 45 and 46, respectively, which can be formed as splines, sawteeth etc., to permit a longitudinal displacement of the ratchet 44 relative to the pawl 41 in an axial direction of the ratchet. The ratchet 44 is provided with an inner opening which is preferably non-round and which has a plurality of engaging formations, for example splines. The pawl 41 is held by a drive plate 42 which is sandwiched between two side plates 43 forming the front of the housing. The upper end of the drive plate is pivotally connected with the end of the piston rod 4 of the drive 1, for example by a pin 12. The side plates 43 are also connected with one another for example by a pin 13.

The fluid-operated tool includes an engaging element formed by a rod 47 which is displaceable axially through the drive ratchet 44 so that its one end or another end extend outwardly beyond the respective side of the tool. The tool also includes reaction means 24' including, on each side of the ratchet 44, a reaction sleeve 48 arranged on a drive bushing 49 and having outer splines 50 and two depressions 51 spaced from one another in an axial direction. A portion of each sleeve 48 is inserted in an opening 43' of the side plate 43, and the outer splines 50 engage with inner splines 43'' of the opening 43'. The reaction means further comprises a reaction socket 52, formed as a separate member, which is mounted on the sleeve 48 by interengagement of the splines 53 of the reaction sleeve with the splines 50 of the sleeve 48. The sleeve 48 is retained on the side plate 43 by a retainer 54, while the reaction socket 52 is retained on the reaction sleeve 48 by a retainer 55 engaging in respective depressions 51. A turning socket 56 is turnably located inside the reaction socket 52 and its splines 57 engage the splines of the rod 47.

The drive ratchet 44 and the drive bushings 49 at both sides of the tool have inner engaging formations for

example splines which engage the outer engaging formations, for example splines, of the rod 47, so that the rod can displace axially without turning relative to the ratchet and the bushing. Both ends of the rod 47 have a shape required for engaging a threaded connector to be tightened or loosened. For example, the ends can be provided with a hexagonal opening, hexagonal head, or a shape permitting attachment of a socket for engaging with a threaded connector, etc..

When it is necessary, for example, to tighten a threaded connector, the rod 47 is pushed axially to the right and is fixed in this position, and the drive ratchet 44 with the reaction sleeve 48 is also pushed axially to the right (see the position shown in Figure 2). When it is necessary, however, to loosen a threaded connector, the rod 47 is pushed axially to the left so that its left end extends outwardly beyond the left side plate 43. The drive ratchet 44 together with the sleeve 48 and the drive bushing 49 is also pushed axially to the left, so that the left sleeve 48 and the drive bushing 49 extend outwardly beyond the left plate 43. The reaction socket 52 with the turning socket 56 are removed from the right sleeve 48 and placed on the left sleeve 48 at the left side of the ratchet 44 of the tool.

A retainer 61 prevents axial withdrawal of the interior parts of the tool from the housing. The retainer 61 can include an inner sleeve 62 retained by balls 63 in the central bore of the rod 47 and a nut 64 screwed on the sleeve 62 and also screwable in the threaded end portion of the opening in each bushing 49. When the rod 47 projects to the right, the retainer 61 is arranged at the left side, and *vice versa*. During operation, the retainer 61 rotates together with the ratchet 44, the bushings 49 and the rod 47 relative to the side plates 43.

It is well known that during the operation of the fluid-operated tools, it is necessary to abut with a reaction element against an object for example a neighbouring nut or bolt, flange, etc. In the inventive tool it is performed by the reaction socket 52. The reaction socket 52 can react against any adjacent stationary object. The reaction socket 52 can be formed as an arm so that it can abut against the adjacent nut.

While the invention has been illustrated and described as embodied in a specific hydraulic tool, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing from the scope of the following claims.

Claims

1. A fluid-operated wrench comprising a housing having a front portion (43) and a rear portion (2); fluid-operated drive means (1) provided in said rear portion (2); a ratchet (44) mounted in said front portion and connected with said drive means (1) so as to be turned by the latter about an axis; a throughgoing passage extending through the hydraulic

wrench and coaxial with said ratchet (44); engaging means (47) located in said front portion (43) of said housing and connected with said ratchet (44) for engagement with a threaded connector to be loosened or tightened; said engaging means being movable through said passage between a first position in which said engaging means (47) extend axially from said one axial side of said ratchet (44) and a second position in which said engaging means (47) extend axially from said other axial side of said ratchet (44); and reaction means (24') for transferring a reaction force to a stationary object during tightening and loosening operations so that said housing (43, 2) becomes stationary while said engaging means (47) turns, wherein said ratchet (44) is formed as a one-way ratchet so that when changing from loosening of a threaded connector to tightening of a threaded connector, and *vice versa*, said housing (43, 2) together with said ratchet (44) is turned over, the engaging means being engageable with a threaded connector at one axial side of the ratchet (44) for loosening the threaded connector and being engageable with a threaded connector at the other axial side of said ratchet (44) for tightening the threaded connector, and wherein said reaction means (24') is movable between a first position in which it is located at said one axial side of the ratchet (44), for reacting against a stationary object during loosening of a threaded connector engaged by said engaging means at said one axial side of the ratchet (44), and a second position in which it is located at said other axial side of the ratchet (44), for reacting against a stationary object during tightening of a threaded connector engaged by said engaging means at said other axial side of the ratchet (44); characterised in that said reaction means (24') has a first portion (48) which is axially movable along said engaging means (47) through said passage so that, in said first position, said first portion (48) extends axially outwardly of said front portion (43) of said housing at said one axial side of said ratchet (44) in the region of said engaging means (47) while in said second position said first portion (48) extends at said other axial side of said ratchet (44) in the region of said engaging means (47), and in that said reaction means (24') also has a second portion (52) which is removable from the wrench so that for moving said reaction means (24') between said first position and said second position said reaction means (24') is removed from said one axial side of said ratchet (44) and mounted at said other axial side of said ratchet (44) and *vice versa*.

Patentansprüche

1. Hydraulisch betriebener Schlüssel mit einem einen vorderen Teil (5) und einen hinteren Teil (2) aufweisenden Gehäuse; einem in dem hinteren Teil (2)

vorgesehenen hydraulisch betriebenen Antriebsmittel (1); einer in dem vorderen Teil angebrachten Ratsche (44), die so mit dem Antriebsmittel (1) verbunden ist, daß sie durch letzteres um eine Achse gedreht wird; einem durch den hydraulisch betriebenen Schlüssel verlaufenden Durchgang (8, 17), der mit der Ratsche (44) koaxial ist; einem in dem vorderen Teil (5) des Gehäuses angeordneten Eingriffsmittel (47), das zum Eingriff mit einem zu lösenden oder festzuziehenden Gewindeverbinder mit der Ratsche (44) verbunden ist; wobei das Eingriffsmittel durch den Durchgang zwischen einer ersten Position, in der sich das Eingriffsmittel (19, 47) axial von der einen axialen Seite der Ratsche (44) erstreckt, und einer zweiten Position, in der sich das Eingriffsmittel (47) axial von der anderen axialen Seite der Ratsche (44) erstreckt, beweglich ist; und einem Reaktionsmittel (24') zur Übertragung einer Reaktionskraft auf einen feststehenden Gegenstand (B) während des Festzieh- oder Lösevorgangs, so daß das Gehäuse (5, 2) feststehend wird, während sich das Eingriffsmittel (19, 47) dreht, wobei die Ratsche (44) als eine Einrichtungsratsche ausgebildet ist, so daß beim Wechsel vom Lösen eines Gewindeverbinders zum Festziehen eines Gewindeverbinders und umgekehrt das Gehäuse (5, 2) zusammen mit der Ratsche (44) umgedreht wird, wobei das Eingriffsmittel zum Lösen eines Gewindeverbinders an einer axialen Seite der Ratsche (44) mit dem Gewindeverbinder in Eingriff gebracht werden kann und zum Festziehen eines Gewindeverbinders an der anderen axialen Seite der Ratsche (44) mit dem Gewindeverbinder in Eingriff gebracht werden kann, und wobei das Reaktionsmittel (24') zwischen einer ersten Position, in der es sich an der einen axialen Seite der Ratsche (44) befindet, zum Wirken gegen einen feststehenden Gegenstand während des Lösens des von dem Eingriffsmittel an der einen axialen Seite der Ratsche (44) in Eingriff genommenen Gewindeverbinders, und einer zweiten Position, in der es sich an der anderen axialen Seite der Ratsche (44) befindet, zum Wirken gegen einen feststehenden Gegenstand während des Festziehens eines von dem Eingriffsmittel an der anderen axialen Seite der Ratsche (44) in Eingriff genommenen Gewindeverbinders beweglich ist; dadurch gekennzeichnet, daß das Reaktionsmittel (24') einen ersten Teil (48) aufweist, der durch den Durchgang (17) axial entlang dem Eingriffsmittel (47) beweglich ist, so daß sich der erste Teil (48) in der ersten Position an der einen axialen Seite der Ratsche (44) im Bereich des Eingriffsmittels (47) axial von dem vorderen Teil (5) des Gehäuses nach außen erstreckt, während sich der erste Teil (48) in der zweiten Position an der anderen axialen Seite der Ratsche (44) im Bereich des Eingriffsmittels (47) erstreckt, und daß das Reaktionsmittel (24')

des weiteren einen zweiten Teil (52) aufweist, der von dem Schlüssel abgenommen werden kann, so daß das Reaktionsmittel (24') zum Bewegen des Reaktionsmittels (24') zwischen der ersten Position und der zweiten Position von der einen axialen Seite der Ratsche (6, 44) entfernt und an der anderen axialen Seite der Ratsche (44) angebracht wird und umgekehrt.

10 Revendications

1. Clé actionnée par un liquide comprenant un corps possédant une portion avant (5) et une portion arrière (2); un moyen d'entraînement (1), actionné par un liquide, prévu dans ladite portion arrière (2); une roue à rochet (44) montée dans ladite portion avant et connectée audit moyen d'entraînement (1) de manière à être entraînée en rotation par ce dernier autour d'un axe; un passage traversant (8, 17) se prolongeant à travers la clé hydraulique et coaxial avec ladite roue à rochet (44); un moyen d'engagement (47) situé dans ladite portion avant (5) dudit corps et connecté à ladite roue à rochet (44) en vue d'un engagement avec un connecteur fileté à desserrer ou à serrer; ledit moyen d'engagement étant déplaçable à travers ledit passage entre une première position dans laquelle ledit moyen d'engagement (19, 47) se prolonge axialement depuis ledit un côté axial de ladite roue à rochet (44) et une deuxième position dans laquelle ledit moyen d'engagement (47) se prolonge axialement depuis ledit autre côté axial de ladite roue à rochet (44); et un moyen de réaction (24') pour transmettre une force de réaction à un objet stationnaire (B) au cours d'opérations de serrage ou de desserrage, de sorte que ledit corps (5, 2) devienne stationnaire pendant la rotation dudit moyen d'engagement (19, 47), ladite roue à rochet (44) étant formée comme une roue à rochet unidirectionnelle de sorte que lorsqu'on passe du desserrage d'un connecteur fileté au serrage d'un connecteur fileté, et vice versa, ledit corps (5, 2) ainsi que ladite roue à rochet (44) sont retournés, le moyen d'engagement pouvant s'engager avec un connecteur fileté sur un côté axial de la roue à rochet (44) pour desserrer le connecteur fileté et pouvant s'engager avec un connecteur fileté sur l'autre côté axial de ladite roue à rochet (44) pour serrer le connecteur fileté, et ledit moyen de réaction (24') étant déplaçable entre une première position dans laquelle il est situé dudit un côté axial de la roue à rochet (44), pour réagir contre un objet stationnaire au cours du desserrage d'un connecteur fileté engagé par ledit moyen d'engagement sur ledit un côté axial de la roue à rochet (44), et une deuxième position dans laquelle il est situé dudit autre côté axial de la roue à rochet (44), pour réagir contre un objet stationnaire au cours du serrage d'un connecteur fileté engagé par

ledit moyen d'engagement sur ledit autre côté axial de la roue à rochet (44); caractérisée en ce que ledit moyen de réaction (24') possède une première portion (48) axialement déplaçable le long dudit moyen d'engagement (47) à travers ledit passage (17) de sorte que, dans ladite première position, ladite première portion (48) s'étend axialement vers l'extérieur de ladite portion avant (5) dudit corps dudit un côté axial de ladite roue à rochet (44) dans la région dudit moyen d'engagement (47) tandis que, dans ladite deuxième position, ladite première portion (48) s'étend dudit autre côté axial de ladite roue à rochet (44) dans la région dudit moyen d'engagement (47), et en ce que ledit moyen de réaction (24') possède également une deuxième portion (52) susceptible d'être retirée de la clé de sorte que pour déplacer ledit moyen de réaction (24') entre ladite première position et ladite deuxième position, ledit moyen de réaction (24') est retiré dudit un côté axial de ladite roue à rochet (6, 44) et monté dudit autre côté axial de ladite roue à rochet (44) et vice versa.

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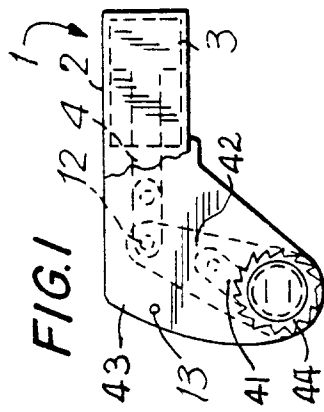


FIG. 1

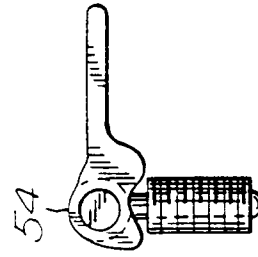


FIG. 3

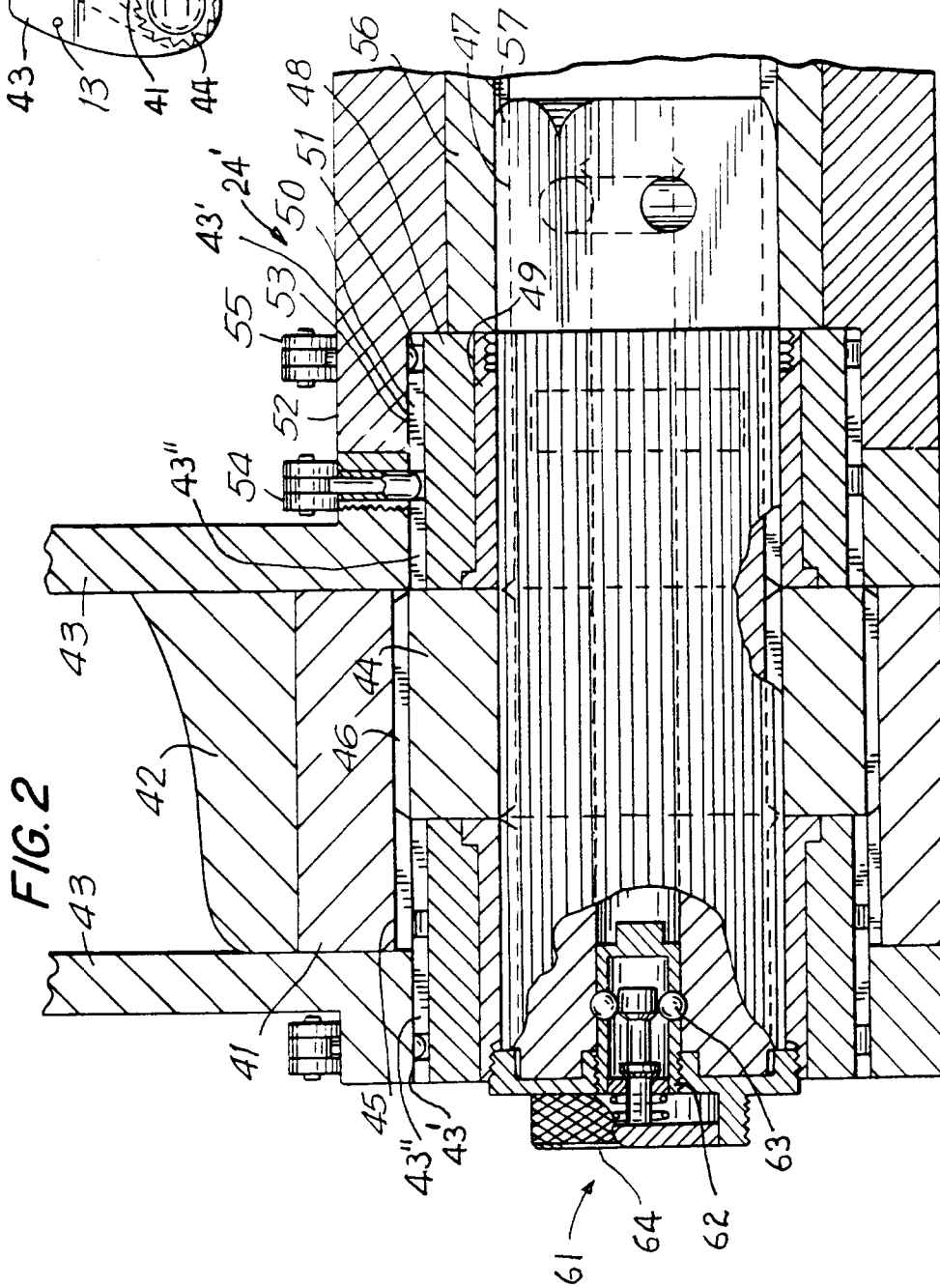


FIG. 2