



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number : **0 458 771 A1**

(12)

EUROPEAN PATENT APPLICATION

(21) Application number : **91850128.9**

(51) Int. Cl.⁵ : **B25B 13/06**

(22) Date of filing : **16.05.91**

(30) Priority : **25.05.90 GB 9011788**

(43) Date of publication of application :
27.11.91 Bulletin 91/48

(84) Designated Contracting States :
BE DE ES FR GB IT NL SE

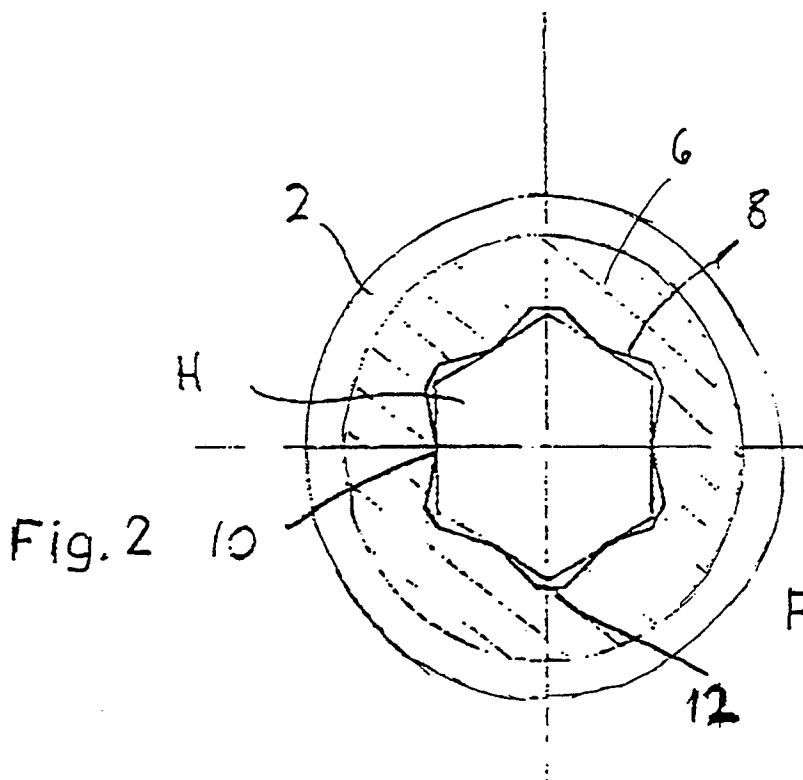
(71) Applicant : **SANDVIK AKTIEBOLAG**
S-811 81 Sandviken 1 (SE)

(72) Inventor : **Mercer, John**
Briar Cottage, 57 Nargate Street
Littlebourne, Kent CT3 IUJ (GB)

(74) Representative : **Taquist, Lennart et al**
Sandvik AB Patents & Licences Fack
S-811 81 Sandviken 1 (SE)

(54) **Socket tools.**

(57) The invention relates to a socket tool comprising a socket head (2) the socket walls of which being made of a hard metal insert (6) by which a much longer tool life is obtainable. The walls of the socket of said insert (c) has a profile comprising spaced portions (10) projecting inwardly towards the central axis of the socket such that the cross-sectional sign of a hexagon inscribed in said socket profile at an intermediate region axially is no greater than said cross-sectional size at either end of the socket.



EP 0 458 771 A1

This invention relates to tools for tightening and releasing nuts and bolts and other threaded parts that have a polygonal periphery, surfaces of which are intended to be gripped by such tools.

It is well known to use a spanner comprising an impact socket head to tighten nuts and bolts, the head having a socket with a cross-section that fits the polygonal periphery of a bolt head or nut. Because the tool must be able to be slipped on and off the threaded part easily, it cannot be an exact fit and in practice the driving force of the tool is transmitted through the lateral edges at the corners of the polygonal periphery of the threaded part.

To obtain an acceptable service life for the socket head, it is made of a material harder than the threaded parts with which it is used. As a result the pressure the tool applies at the corners of the polygonal periphery tends to cause damage to the edges of the threaded part there. This is particularly undesirable in a manufacturing plant where the slightest sign of damage may affect the attractiveness of the product. The use of softer material for the tool to avoid such damage is precluded by the excessive wear of the tool socket that would result.

To avoid the problem of slippage, special forms of bolt head and nut body have been proposed. In US 3 908 489 a socket tool is described for a threaded part that has a generally frusto-conical head or body with a series of tapered axial grooves at intervals around its outer periphery. The tool has a complementary socket, with ribs having slightly less taper than the grooves. The tool transmits torque to the threaded part through the engagement of the ribs in the grooves and the disclosure suggests that the geometry of the engagement can be so arranged that the torque does not produce any force component that would lead to slippage.

Such a solution is of very limited value, however, because it depends upon a special form of head or body on the threaded part.

In a socket tool according to the invention, the walls of the socket have a profile comprising a series of spaced portions projecting inwardly towards a central axis of the socket such that a regular hexagon can be inscribed within the socket profile in a plane perpendicular to said axis with the sides of the hexagon intermediate its corners touching the projections and with said corners spaced from the socket profile, the cross-sectional size of said hexagon in a plane in an intermediate region of the axial length of the socket being no greater than said cross-sectional size at either end of the socket.

With this arrangement, it is possible to avoid contact with the corner or edge regions of a standard hexagonal profile threaded part and the driving pressure applied by the socket is better absorbed without damage to the threaded part.

It may be mentioned here that, in the case of the

tool of US 3 908 489, the configuration of tapered ribs of the socket could be arranged to grip a standard hexagonal profile bolt head or nut body to transmit torque to it. However, the ribs would make contact only with the peripheral edges of an end face of the non-tapered head or body and if any substantial torque were to be transmitted the screwed part would suffer more damage than in the use of a conventional tool.

In a socket tool according to the present invention it is possible, moreover, to make the socket walls of a material such as a hard metal without risk of damage to the threaded parts, so that a much longer tool life is obtainable. The hard metal should form at least said projecting portions of the socket profile and conveniently it is provided as an insert fixed within a bore or depression in a main body of the socket, e.g. by brazing or shrink fitting.

To facilitate the use of a tool according to the invention, it is also possible to profile the regions of engagement of the socket so that they protrude further towards the centre of the socket at a region some distance in from the outer face of the socket. In this way, as the socket begins to be slipped onto the threaded part, there is initially a slight clearance between the periphery of the socket and the opposed faces of the threaded part.

The invention is illustrated by way of example in the accompanying drawings, which show some of the specific forms that a socket according to the invention can be given. In the drawings:

Fig 1 is a side view of a socket head tool according to the invention, partially sectioned in a radial plane;

Fig 2 is a plan view of the socket head of Fig 1 from below, showing the engagement of the socket with the hexagonal head of a threaded part;

Fig 3 is a detail radial section illustrating a modification of the socket head as shown in Fig 1;

Fig 4 to 6 are detail plan views illustrating other modifications of the socket head as shown in Fig 3.

Figs 1 and 2 illustrate a socket head 2 that can be of generally conventional form externally. The external features will not be described here as they form no part of the present invention. What is significant, however, is that in place of the usual hexagonal recess formed in the bottom face of the socket head, the main body of the illustrated socket has a counterbore 4 in which a hard metal insert 6 is secured.

As can be seen most clearly from Fig 2, the insert, which may be brazed or otherwise fixed against rotation, provides a socket of a form fitting the hexagonal side faces of a threaded part such as the head H of a bolt, but the hexagonal main sides 8 of the socket are themselves profiled so that the bolt head is engaged only in the central regions of its side faces. Each side of the generally hexagonal socket thus has a gener-

ally convex form with its central region 10 protruding towards the centre of the socket, while the junctions 12 between adjacent sides are spaced away from corners or the bolt head. When the socket head is applied to the bolt, therefore, it grips the bolt head at the centres of its side faces and there is no risk of burring or otherwise damaging the corners of the faces.

Preferably, the main sides of the socket also have a profile in the axial direction, as in the example illustrated in Fig 3. The generally convex profile 14 illustrated there indicates that the torque is applied by the socket head to the bolt head through a portion intermediate the height of the socket sides 8. With the profile illustrated in Fig 3, firstly there is some clearance between the socket head and bolt head as the socket head is initially brought onto the bolt head and, secondly, the socket head does not have to be truly axial to the bolt while torque is being applied. Use of the tool is thus made easier.

The lateral profiling of the socket sides may take a variety of forms and illustrations of some alternatives are shown in Figs 4 and 6. In Fig 4, the sloping facets that form the protruding central region 10 on each side of the socket in Fig 2 have been replaced by a central region formed with V-shaped rib 10a. In Fig 5, the rib 10b is given a generally semi-circular section. In the case of Fig 6, the sharply angled junctions 12 shown in Fig 2 between the sides of the profile have been modified to give blended junctions 12a between adjacent facets. Each of these alternatives may be used with the longitudinal profile shown in Fig 3 and it will be appreciated that the longitudinal profile can itself take a number of different forms.

is provided in the form of a sleeve-like insert (6) fixed within a bore or depression (4) in a main body of the socket.

5 4. A tool according to any of claims 1 to 3 wherein the projecting portions (10) have an axial profile (14) in which the radial distance from the projections to the central axis increases towards the ends of the socket.

10 5. A tool according to any one of the preceding claims wherein the socket is substantially of hexagon form having said projecting portions (10) at the middle of each side of said hexagon form.

15

20

25

30

35

Claims

1. A tool having a socket for engagement with the periphery of a threaded part to rotate said part, the walls (8) of the socket having a profile comprising a series of spaced portions (10) projecting inwardly towards a central axis of the socket such that a regular hexagon can be inscribed within the socket profile in a plane perpendicular to said axis with the sides of the hexagon intermediate its corners touching the projections and with said corners spaced from the socket profile, **characterized** in that the cross-sectional size of said inscribed hexagon in a plane in an intermediate region of the axial length of the socket is no greater than said cross-sectional size at either end of the socket.
2. A tool according to claim 1 wherein at least said portions of the profiled walls (8) of the socket are of hard metal.
3. A tool according to claim 2 wherein the hard metal

40

45

50

55

Fig.1

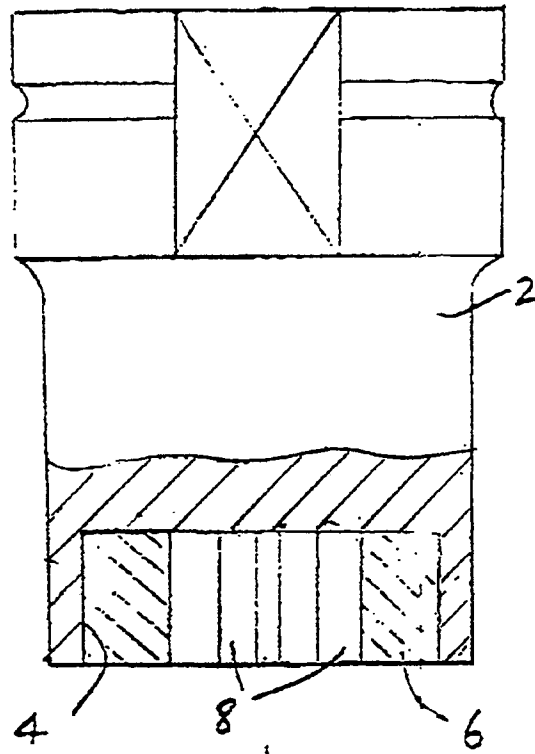


Fig. 3

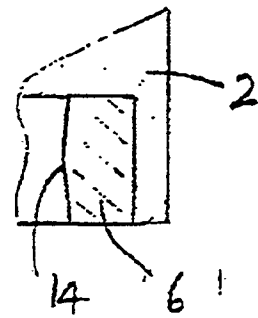


Fig. 2

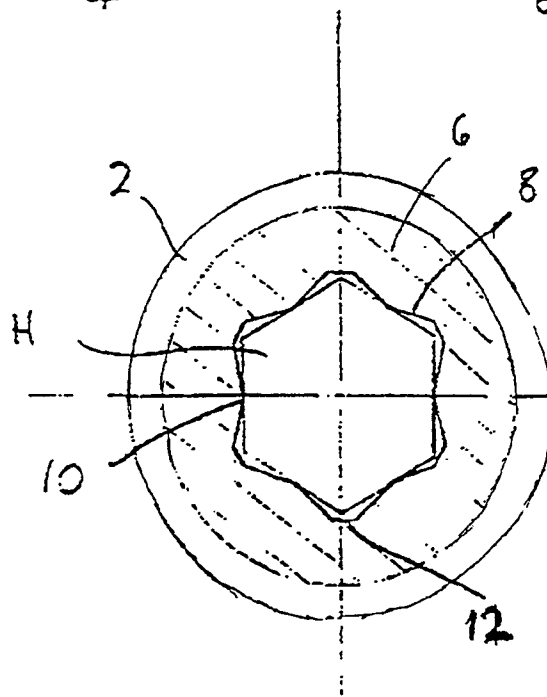


Fig. 5

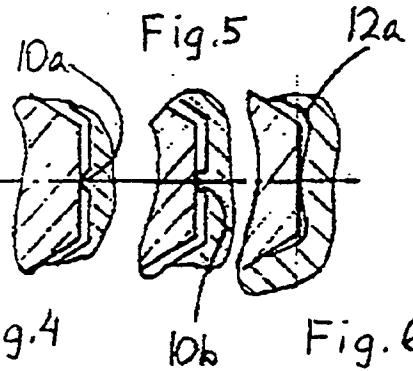


Fig. 4

Fig. 6



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 91850128.9
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. CL5)
X	<u>EP - A1 - 0 236 630</u> (RUZICKA) * Fig. 5,13,15,16 * --	1,5	B 25 B 13/06
X	<u>US - A - 2 848 916</u> (REYNOLDS) * Fig. 3 * --	1,5	
A	<u>US - A - 4 126 063</u> (PALMER) * Fig. 1,2,3 * --	1,4,5	
A	<u>US - A - 4 742 735</u> (STENCEL) * Fig. 1,2 * --	2,3	
A	<u>US - A - 2 337 368</u> (BOHLER) * Fig. 5 * ----	3	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. CL5) B 25 B 13/00
Place of search VIENNA		Date of completion of the search 01-08-1991	Examiner BENCZE
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EP0 FORM 150 02.92 (P0401)