

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
24 December 2003 (24.12.2003)

PCT

(10) International Publication Number
WO 03/106084 A1

(51) International Patent Classification⁷: **B23B 27/04**

BERMINGE, Erik [SE/SE]; S Skeppsbron 10 a 1tr, S-802 80 Gävle (SE). **OLSSON, Helena** [SE/SE]; Klintbergsgatan 13, S-803 24 Gävle (SE).

(21) International Application Number: PCT/SE03/01013

(22) International Filing Date: 16 June 2003 (16.06.2003)

(74) Agent: **TÅQUIST, Lennart**; Sandvik AB, S-811 81 Sandviken (SE).

(25) Filing Language: Swedish

(81) Designated States (*national*): CA, CN, JP, KR, US.

(26) Publication Language: English

(84) Designated States (*regional*): Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR).

(30) Priority Data:
0201861-2 18 June 2002 (18.06.2002) SE

(71) Applicant (*for all designated States except US*): **SANDVIK AB** [SE/SE]; S-811 81 Sandviken (SE).

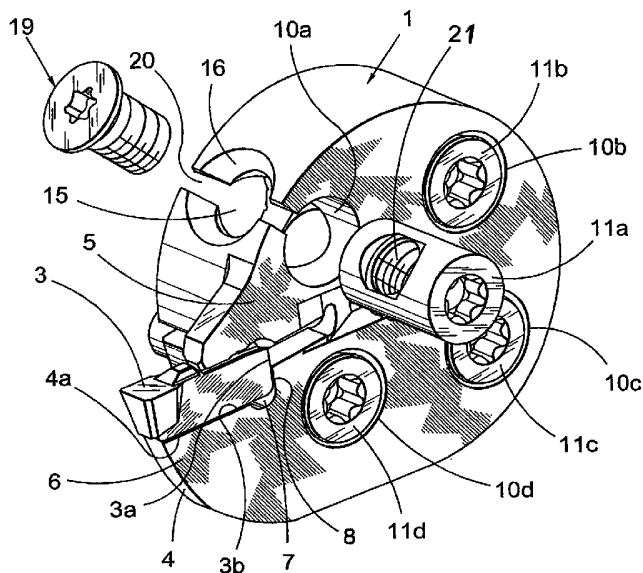
Published:
— with international search report

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **HANSSON, Per** [SE/SE]; Iggövagen 57, S-805 96 Gävle (SE).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CUTTING TOOL HEAD FOR A METALWORKING TOOL



(57) Abstract: The present invention relates to a tool head for a chip metal working tool having a cutting insert (3), comprising a basic holder (1) and an integral insert holder (4), the forward portion of which is provided with an insert pocket between a lower support portion (6) and an upper clamp portion (5) wherein the upper clamp portion (5) is actuatable by a press device. The characteristics is that the press device is in the shape of a clamp screw (19) with a conical head (18) that is received in a recess in the basic holder (1) and arranged to be subjected to displacement in its axial direction such that its conical head (18) upon insertion in a slit (20) spaced from the insert pocket achieves such bending outwardly of the upper portion of the basic holder such that thanks to its movement a clamping of the insert occurs.

WO 03/106084 A1

Cutting tool head for a metalworking tool

The present invention relates to a tool head for machining tool of the kind intended for chipbreaking machining of metal. The tool head comprises a basic holder and a
5 toolholder connected therewith. More specifically this tool is intended for that type of machining referred to as parting and grooving.

State of the art

10 Within the field of chip removing machining there are tool couplings of various kinds in order to achieve a torque resistant connection between various holders and adapters, though most common in turning tools of various kinds. For instance, Swedish patent application 7813038-2 discloses a tool for parting and grooving wherein co-operating
15 serrations with clamping screws are used for clamping purposes. In this case the number of screws for clamping the adapter is three. This means that the activity of first disengaging three comparatively long screws and subsequently tightening them again when insert change is needed for indexing a new cutting edge is rather time consuming. Further, Swedish patent application 9004032-0 discloses a cutting tool comprising an
20 insert-provided holder blade in an insert pocket where the insert is clamped by arranging for a press means to engage at inclined angle towards a slot in the insert pocket such that an upper clamping arm portion of the holder blade is subjected to elastic bending and a force activated therefrom towards the upper surface of the insert. Due to the fact that the press means is constituted by a relatively long pin this system becomes relatively space consuming in a narrow holder blade for a parting tool.

25

Object and features of the invention

The present invention aims at removing the shortcomings mentioned above in connection with previously known tools of the type in question and at providing an
30 improved coupling. Thus, a primary object of the invention is to create a device by means of which the necessary cutting insert exchanges are effected in a quick and simple way without dismounting each clamp screw in its entirety. A further object is to create a tool that makes it possible eliminate a risk that the clamp means of that type are lost. Still a further object of the invention is to create a tool where during dismounting
35 there is no need for using different key means.

According to the invention at least the primary object is attained by means of the features outlined in the characterizing portion of claim 1. Further, preferred
40 embodiments are defined in the following sub-claims.

40

Brief description of enclosed drawings

In the drawings:

45 Fig. 1 is perspective exploded view showing a tool according to an embodiment of the invention, including a holder and an adapter in the form of a cutting head, said holder as well as the adapter being schematically illustrated,

Fig. 2 is a side view of a basic holder and an adapter engaged therewith according to the embodiment in Fig. 1.

Detailed description of a preferred embodiment of the invention

5 In Fig. 1-2 is shown a basic holder 1 comprising a central bore 2 for engagement with a tool machine and 3 designated a cutting insert. The basic holder 1 comprises a forwards and laterally extending portion 4. The basic holder is intended to be engaged to a tool machine, for instance a multi-purpose lathe. The portion 4 extending laterally is
10 provided as a blade-shaped portion comprising a lower insert supporting portion 6 and an integral upper clamp portion 5 with smaller width than the remainder of the basic holder 1. Between the upper clamp portion 5 and the lower clamp portion 6 there is provided a clamping slot 7 for the receipt of an insert 3 for chip removing machining. The insert's rear end surface 3a is intended to abut against a shoulder 8 which limits its
15 axial rear displacement. The shoulder 8 extends from the lower support portion 6 of the lateral side portion 4. Due to this, the clamping slot 7 transforms rearwardly into a slot extension 9 with considerably smaller height than the forward slot 7. The endportion of the slot extension 9 is designated 9a. Distinguishing is also that the lower surface 3b of the cutting insert preferably is oriented in a direction perpendicularly towards the rear
20 end surface 3a of the insert and that said lower surface 3b simultaneously is parallel with the intended feed direction. The rear portion of the upper portion of the insert and the lower surface 3b have preferably been provided with concave V-shaped wedge-type recesses in the manner described and shown in Swedish patent application 9703434-2 the content of which is incorporated herewith.

25 The basic holder is provided with a plurality of spaced cylindrical holes 10a, 10b, 10c, 10d which extend laterally in a direction parallel with the central axis CL of the basic holder. In one of these holes there is provided a corresponding nut roll 11 that is located therein with a suitable play whereby the axial length of each nut roll is the same as the
30 thickness of the basic holder 1 and the integral toolholder 4. Further, it is intended to have three clamp screws 12, 13, 14 received in the remainder of said holes 10b, 10c, 10d to be threadably engaged in corresponding holes in suitable connecting portion in a corresponding machine (not shown). Adjacent to the hole 10a that is located at a small inclined distance above the clamp portion 5 there is cylindrical recess 15 oriented
35 perpendicularly from said hole 10a, the upper end portion of which has an outwardly facing conical recess 16.

The recess 15 extends radially inwardly to a position between the bore 2 and the end portion 9a on the slot 9 such that a hinge 17 is provided therebetween. This recess is
40 intended to receive a clamp screw with a correspondingly formed conical head 18, the lower portion of which is intended to be threadably engaged in a threaded portion 21 of the nut roll 11a. As best appears from Fig. 1 the tool head 1 is also provided with a laterally extending slot 20 that extends to the recess 12 which slot extends all the way through said head whilst extending centrally through said conical recess 16. From Fig. 1
45 it appears that the insert receiving slot 7 extends laterally through both the basic holder 1 and the toolholder 4. The inner surface of the holder 1 is provided with a serration 22 that extends in the longitudinal direction of the insert except for the surface portion 23 that is located between the screw 19 and the slot extension 9. A corresponding serration

- is understood to be present on the machine in which the holder 1 is to be connected. Upon insertion of a new cutting insert 3 the insert is subjected to clamping by tightening the partially conical screw 19. Upon axial insertion of the screw head 18 said slot 20 will become widened and the clamp portion 5 will be brought into engagement with the top surface of said insert 3. Upon exchanging insert it will only be necessary to disengage the clamp screw 19 a minor portion whereby the width of said slot will resume its width in a non-clamped position such that the insert can be exchanged without having to disengage the screw 19 in its entirety.
- 5
- 10 The screw receiving recess 15 ought to extend longitudinally in a direction that is provided at an angle of 25-105° relative to the longitudinal direction of the insert pocket. This angle preferably amounts to 35-90° in order to obtain an optimal moment arm in relation to the hinge 17. At the same time the basic holder 1 should preferably have a width that is several times the width of the insert-receiving portion 4 which represents the insert carrying holder portion. With the embodiment shown in Fig. 1-2
- 15 the longitudinal extent of the insert 3 should be larger than the underneath support surface 4a of the insert holder 4 as appears from Fig. 2 such that the insert obtains a side support from the basic holder 1.

Patent claims

1. Tool head for chip metal working machining with a cutting insert (3), comprising a basic holder (1) and an insert holder (4) connected therewith the front portion of which is provided with an insert pocket located between a lower support portion (6) and an upper clamp portion (5) wherein said upper clamp portion (5) is actuatable by a press device into clamping surface engagement with the cutting insert (3) whereby the tool is provided with a slot (20) spaced from the insert pocket, **characterized** in that the pressing device is in the shape of a clamp screw (19) having a conical head (18) received in a recess in the basic holder (1) and arranged to exercise a movement axially such that its conical head is inserted into said slot (20) and upon tightening provides such outward bending of the upper portion of the holder so that, due to its movement, a clamping of the insert is accomplished.
2. Tool head according to claim 1, **characterized** in that the basic holder (1) has a larger width than the insert holder (4) and that both are provided integrally in one piece.
3. Tool head according to claim 1 or 2, **characterized** in that the nut roll (11a) provided for the receipt of the clamp screw (19) is received in a cylindrical recess (10a) oriented perpendicularly in relation to the longitudinal direction of the insert (3) and the insert slot (7).
4. Tool head according to any of the claims 1-3, **characterized** in that the screw-receiving recess (15) has a longitudinal extension at an angle oriented at an angle of 35-90° from the longitudinal direction of the insert pocket.
5. Tool head according to any of the claims 1-4, **characterized** in that the insert receiving slot (7) in the rearward direction extends into a slot extension (9) with a smaller height than the forward slot (7).
6. Tool head according to any of the claims 1-5, **characterized** in that the rear insert end surface (3a) is arranged to axially abut against a support surface (8) in the holder (4) which preferably extends essentially perpendicularly in relation to the underneath surface (3b) of the insert.
7. Tool head according to any of the claims 1-6, **characterized** in that the longitudinal extension of the insert (3) is longer than the longitudinal extent of the lower support surface (4a) in the insert holder thus providing a side support for the insert from one side surface of the basic holder (1).
8. Tool head according to any of the claims 1-7, **characterized** in that the side surface of the basic holder (1) is provided with serrations (22) that extend in a direction parallel with the direction of the insert (3).
9. Tool head according to any of the claims 1-7, **characterized** in that the portion (23) located between the clamp screw (19) and the slot extension (9) of the basic holder (1) has a planar surface without serrations.

1/1

Fig. 1

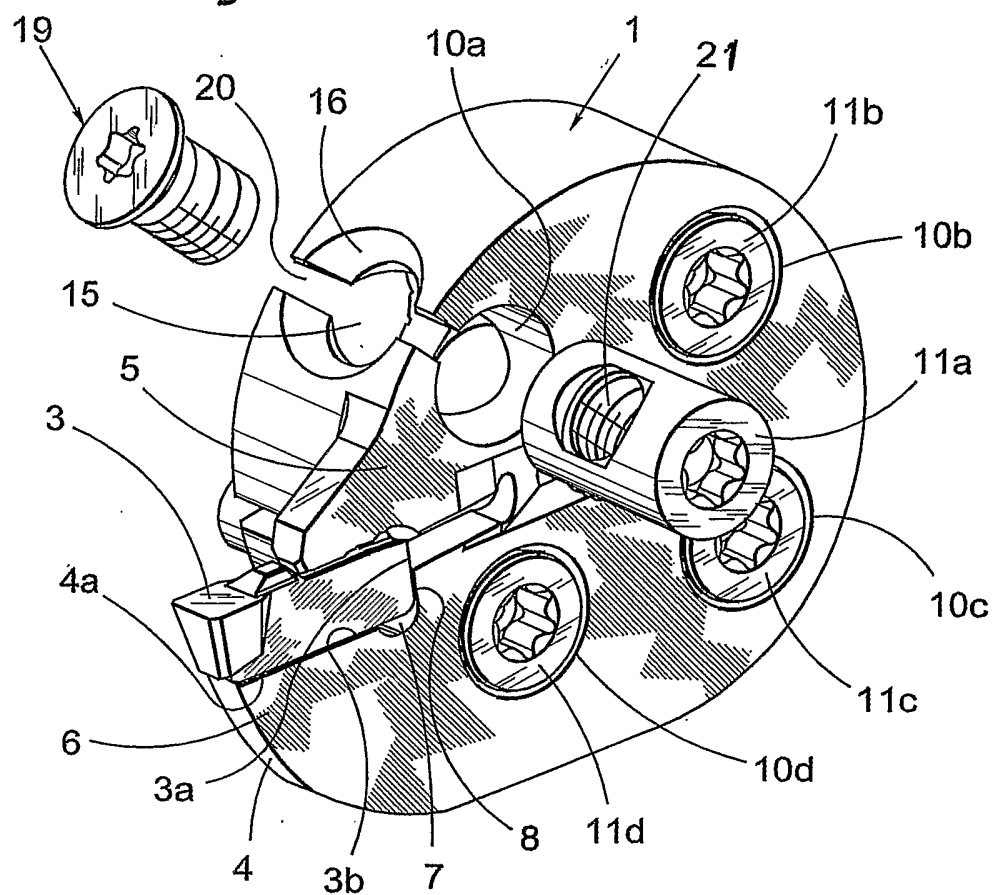
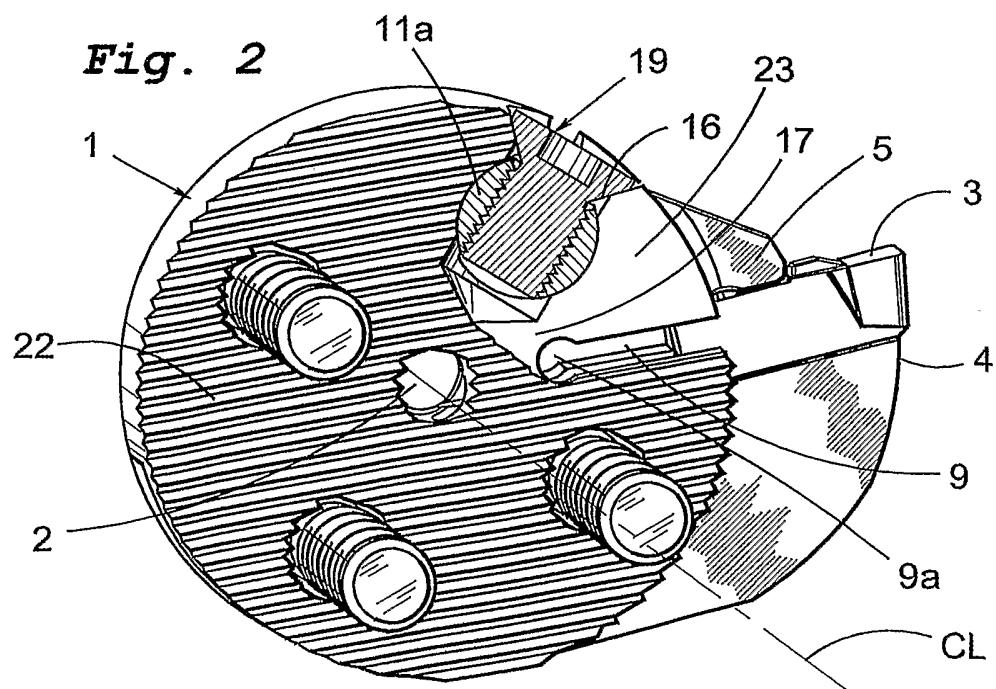


Fig. 2



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 03/01013

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B23B 27/04

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)

IPC7: B23B, B23C

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1025939 A1 (SANDVIK AKTIEBOLAG), 9 August 2000 (09.08.00), page 4, line 21 - line 22, figures 1,2, abstract --	1-9
Y	US 4887945 A (JOSEPH PANO), 19 December 1989 (19.12.89), figures 2-5,7, abstract --	1-9
Y	US 5112164 A (JOSEPH PANO), 12 May 1992 (12.05.92), figure 7, abstract --	1-9
A	US 6186704 B1 (JOHN G. HALE), 13 February 2001 (13.02.01), figure 1, abstract --	1-9

☒ 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

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

11 Sept 2003

Date of mailing of the international search report

12 -09- 2003

Name and mailing address of the ISA/

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Fredrik Strand/MP

Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 03/01013

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CH 688794 A5 (STELLRAM S.A.), 31 March 1998 (31.03.98), figures 1,2, abstract --	1-9
A	DE 3301919 A1 (KELLER, WERNER), 26 July 1984 (26.07.84), figures 1-3, abstract -- -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

26/07/03

International application No.

PCT/SE 03/01013

Patent document cited in search report				Publication date		Patent family member(s)	Publication date
EP	1025939	A1	09/08/00	AT	244091	T	15/07/03
				AU	2865399	A	27/09/99
				CA	2323436	A	16/09/99
				EP	1066614	A	10/01/01
				JP	2000225540	A	15/08/00
				JP	2002507005	T	05/03/02
				SE	516973	C	26/03/02
				SE	9900363	A	05/08/00
				US	6270294	B	07/08/01
US	4887945	A	19/12/89	AT	46285	T	15/09/89
				DE	3635193	A,C	24/03/88
				EP	0259846	A,B	16/03/88
				SE	0259846	T3	
				IL	83726	A	29/11/90
				JP	1501537	T	01/06/89
				JP	4035282	B	10/06/92
				WO	8801921	A	24/03/88
US	5112164	A	12/05/92	DE	4028361	A,C	21/03/91
				IL	91574	A	16/02/92
				JP	2902085	B	07/06/99
				JP	3142106	A	17/06/91
US	6186704	B1	13/02/01	AU	3381700	A	21/09/00
				BR	0010272	A	22/01/02
				CA	2360501	A	08/09/00
				DE	60002994	D	00/00/00
				EP	1159101	A,B	05/12/01
				JP	2002538010	A	12/11/02
				WO	0051768	A	08/09/00
CH	688794	A5	31/03/98	NONE			
DE	3301919	A1	26/07/84	NONE			