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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 March 2015 (05.03.2015)

WIPO | PCT

(10) International Publication Number
WO 2015/029009 A1

(51) International Patent Classification:
B23B 27/08 (2006.01) *B23B 29/14* (2006.01)
B23B 29/04 (2006.01)

(21) International Application Number:
PCT/IL2014/050565

(22) International Filing Date:
24 June 2014 (24.06.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
14/011,425 27 August 2013 (27.08.2013) US

(71) Applicant: **ISCAR LTD.** [IL/IL]; P.O. Box 11, 24959 Tefen (IL).

(72) Inventor: **HECHT, Gil**; 30/18 Ahad Ha'am Street, 22443 Nahariya (IL).

(74) Agents: **ISCAR PATENT DEPARTMENT** et al.; P.O. Box 11, 24959 Tefen (IL).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

(54) Title: HARD METAL CUTTING TOOL HOLDER BLADE AND CUTTING TOOL HAVING SUCH HOLDER BLADE

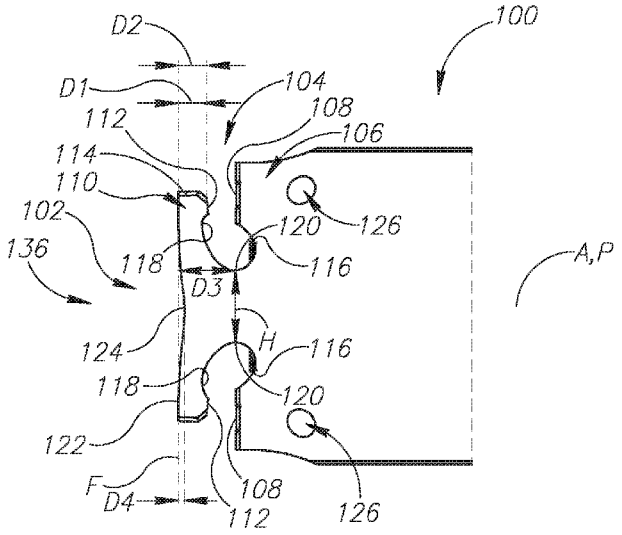


FIG.2

(57) Abstract: A cutting tool holder blade (100,101) is formed of hard metal such as cemented carbide, the cutting tool holder blade (100,101) having a front plane (F), a perpendicular mid-plane (P). An insert pocket (104) of the holder blade (100,101) has a base jaw (106) and a clamping jaw (110) resiliently connected to the base jaw (106) in a unitary one piece construction. The base jaw (106) has a base jaw abutment surface (108) and the clamping jaw (110) has a clamping surface (112) facing opposite the base jaw abutment surface (108), and an insert stop surface (114). A curved inner surface (116) extends from the base jaw abutment surface(108) towards and along the clamping jaw (110), the curved inner surface (116) having a front extremity portion (118). The clamping jaw (110) is narrowed down adjacent the front extremity portion (118), such that the clamping surface (112) overhangs the front extremity portion (118) of the curved inner surface (116), in a direction towards the base jaw (106) and away from the front plane (F).

WO 2015/029009 A1

HARD METAL CUTTING TOOL HOLDER BLADE AND CUTTING TOOL HAVING SUCH HOLDER BLADE

FIELD OF THE INVENTION

[001] The present invention relates to a cutting tool holder blade and a cutting tool therefor, in general, and to a cutting tool holder blade made of hard metal, in particular.

BACKGROUND OF THE INVENTION

[002] Metal cutting tools used in turning operations include cutting inserts which are removably secured in a tool holder blade. The cutting inserts are usually formed of a suitably hard material, i.e., cemented carbide, where the tool holder may be formed of a less hard material (e.g., steel) or of a hard material (e.g., hard metal), and is reusable following the disposal of a worn or damaged cutting insert.

[003] Cutting tool holders of the holder blade type have a portion for receiving and holding a cutting insert. The portion for receiving the cutting insert may have an insert pocket with a resilient clamping part, which is flexibly moveable when the cutting insert is placed inside the insert pocket. Cutting tool holder blades as mentioned above are disclosed, for example, in the following patent publications: US4604004, US4909677, US5054967, US7163361 and US7578640.

SUMMARY OF THE INVENTION

[004] In accordance with the subject matter of the present application, there is provided a cutting tool holder blade having a longitudinal mid-axis lying on a mid-plane, the cutting tool holder blade comprising:

at least one insert clamping portion with a front plane perpendicular to the mid-plane, the insert clamping portion having at least one insert pocket, the insert pocket comprising:

a base jaw having a base jaw abutment surface;

a clamping jaw resiliently connected to the base jaw in a unitary one piece construction, the clamping jaw having a clamping surface facing opposite the base jaw abutment surface and an insert stop surface; and

a curved inner surface extending from the base jaw abutment surface towards and along the clamping jaw, the curved inner surface having a front extremity portion, wherein:

the holder blade is formed of hard metal, and

a first minimum longitudinal distance between the front extremity portion and the front plane is smaller than a second minimum longitudinal distance between the clamping surface and the front plane.

[005] In some embodiments of the present invention, the cutting tool holder blade as described above is mirror symmetric about the mid-plane, the insert clamping portion having two insert pockets located on opposite sides of the mid-plane, the curved inner surface has an inner extremity portion, spaced apart from the front extremity portion, with a minimum transverse distance extending between the inner extremity portions of both insert pockets in the same insert clamping portion, a third longitudinal distance extends between the inner extremity portion of each insert pocket and the front plane, and the minimum transverse distance is greater than the third longitudinal distance.

[006] In accordance with another aspect of the subject matter of the present application, there is provided a cutting tool comprising:

a cutting tool holder blade as described above, and

a cutting insert resiliently retained in one of the at least one insert pocket of the cutting tool holder blade.

The cutting insert may comprise:

a cutting portion and a locating portion, the cutting portion having a cutting edge formed at the intersection of a rake surface and a relief surface;

an upper surface, a lower surface and a peripheral side surface extending therebetween, the locating portion extending from the cutting portion away from the upper surface, the locating portion having opposing forward and rear locating surfaces, the forward locating surface being located in the lower surface, the peripheral side surface comprising:

opposing forward and rear surfaces and opposing side surfaces extending between the forward and rear surfaces, the relief surface being located in the forward surface, the rake surface being located in the upper surface, and the rear locating surface being located in the rear surface; and

a lower locating surface located in the lower surface and opposing the upper surface, and extending between the forward surface and the forward locating surface.

[007] In such a cutting tool, the base jaw abutment surface of the base jaw abuts the rear surface of the cutting insert, the clamping surface of the clamping jaw abuts the forward locating surface of the cutting insert, and the insert stop surface of the clamping jaw abuts the lower locating surface of the cutting insert.

[008] In accordance with yet another aspect of the subject matter of the present application, there is provided a cutting tool holder blade having opposite ends and a longitudinal mid-axis lying on a mid plane and extending between the opposite ends, the cutting tool holder blade comprising:

at least one insert clamping portion having at least one insert pocket, the insert pocket comprising:

a base jaw having a base jaw abutment surface;

a clamping jaw resiliently connected to the base jaw in a unitary one piece construction, the clamping jaw having a clamping surface facing opposite the base jaw abutment surface and an insert stop surface; and

a curved inner surface extending from the base jaw abutment surface towards and along the clamping jaw, the curved inner surface having a front extremity portion,

wherein:

the holder blade is formed of hard metal;

the at least one insert clamping portion has a front plane extending perpendicular to the mid-plane, the front plane passing through a forwardmost portion of a front surface of the at least one insert clamping portion; and

the clamping surface overhangs the front extremity portion of the curved inner surface, in a direction towards the base jaw and away from the front plane.

BRIEF DESCRIPTION OF THE DRAWINGS

[009] For a better understanding of the present invention and to show how the same may be carried out in practice, reference will now be made to the accompanying drawings, in which:

Fig. 1 is a schematic illustration of a cutting tool according to one embodiment of the present invention;

Fig. 2 is a partial detail side view of the cutting tool holder blade of Figure 1;

Fig. 3 is a detail view of a portion of the cutting tool of Figure 1;

Fig. 4 is a side view of the portion of the cutting tool of Figure 1;

Fig. 5 is a first exploded view of the portion of the cutting tool shown in Figure 3;

Fig. 6 is a second exploded view of the portion of the cutting tool shown in Figure 3;

Fig. 7 is a schematic illustration of a cutting tool according to another embodiment of the present invention; and

Fig. 8 is a detail side view of the cutting tool holder blade of Figure 7.

[010] It will be appreciated that for simplicity and clarity of illustration, elements shown in the figures have not necessarily been drawn to scale. For example, the dimensions of some of the elements may be exaggerated relative to other elements for clarity, or several physical components may be included in one functional block or element. Further, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements.

DETAILED DESCRIPTION OF THE INVENTION

[011] In the following description, various aspects of the present invention will be described. For purposes of explanation, specific configurations and details are set forth in order to provide a thorough understanding of the present invention. However, it will also be apparent to one skilled in the art that the present invention may be practiced without the specific details presented

herein. Furthermore, well-known features may be omitted or simplified in order not to obscure the present invention.

[012] Reference is now made to Figure 1, depicting a cutting tool **140** according to a first embodiment of the present invention. The cutting tool **140** is a turning cutting tool having a cutting tool holder blade **100** and a cutting insert **150** retained therein. The cutting tool holder blade **100** is an elongated rectangular holder blade having opposite ends **136** and four identical insert pockets **104**, one in each corner of the rectangle.

[013] Reference is further made to Figures 2-6, depicting various views of the cutting tool **140** and its cutting tool holder blade **100**. The cutting tool holder blade **100** is formed of hard metal, such as cemented carbide. A resilient clamping arrangement formed in a hard metal construction may tend to crack or break under clamping forces, due to the large modulus of elasticity of the hard metal. In comparison, the modulus of elasticity of cemented carbide is nearly three times larger than the modulus of elasticity of steel. Therefore, when a hard metal resilient clamping arrangement is used, it is desirable to have higher elasticity which would withstand the elastic deformation caused by resilient clamping of a cutting insert in a cutting tool.

[014] As mentioned above, the cutting tool **140** incudes the cutting tool holder blade **100**, and a cutting insert **150** resiliently retained in one of the insert pockets **104** of the cutting tool holder blade **100**. The cutting tool holder blade **100** has a longitudinal mid-axis **A** lying on a mid-plane **P** and extending between the opposite ends **136**. The cutting tool holder blade **100** comprises at least one insert clamping portion **102**. The insert clamping portion **102** has a front surface **122** defining a front plane **F** perpendicular to the mid-plane **P**. In particular, the front plane **F** extends perpendicular to the mid-axis **A** and passes through the forwardmost portion of the front surface **122**.

[015] Each insert clamping portion **102** has at least one insert pocket **104**. Each insert pocket **104** includes a base jaw **106** and a clamping jaw **110**. The base jaw **106** has a base jaw abutment surface **108**. The clamping jaw **110** is resiliently connected to the base jaw **106** in a unitary one piece construction. The clamping jaw **110** has a clamping surface **112** facing opposite the base jaw abutment surface **108** and an insert stop surface **114** facing in a direction transverse to the clamping surface **112**. In a side view of the cutting tool holder blade **100**, taken along the mid-axis **A**, the insert stop surface **114** extends substantially parallel to the mid-axis **A**.

[016] A curved inner surface **116** extends from the base jaw abutment surface **108** towards the clamping jaw **110**, extending further along the clamping jaw **110** towards the insert stop surface **114**. The curved inner surface **116** has a front extremity portion **118**, which is spaced apart from the front plane **F** by a first minimum longitudinal distance **D1** (i.e., in a direction parallel to the mid-axis **A**). The first minimum longitudinal distance **D1** is the shortest longitudinal distance between any portion of the curved inner surface **116** and the front plane **F**. At a point closest to the mid-plane **P**, the curved inner surface **116** has an inner extremity portion **120**, which is spaced apart from the front extremity portion **118**.

[017] A second minimum longitudinal distance **D2** is the minimum distance between the clamping surface **112** and the front plane **F**. The second minimum longitudinal distance **D2** is the shortest longitudinal distance between any portion of the clamping surface **112** and the front plane **F**. In some cases, e.g., as shown in Figure 2, the clamping surface **112** is angled with respect to the mid-plane **P**, in order to form a wedge formation with the base jaw abutment surface **108**. In such case, the second minimum longitudinal distance **D2** extends between the front plane **F** and the end of the clamping surface **112**, which is closest to the insert stop surface **114**.

[018] According to the present invention, the first minimum longitudinal distance **D1** is smaller than the second minimum longitudinal distance **D2**. In other words, the clamping jaw **110** is narrower, in the longitudinal direction, adjacent to the front extremity portion **118** of the curved inner surface **116**, than at the clamping surface **112**. Stated differently, the clamping surface **112** overhangs the front extremity portion **118** of the curved inner surface **116**, in a direction towards the base jaw **106** and away from the front plane **F**. And as seen in Fig. 3, this overhang is present even when the cutting insert **150** is retained in the insert pocket **104**. In addition, the retained cutting insert **150** is spaced apart from the front extremity portion **118** of the curved inner surface **116**. In this manner, the clamping jaw **110** has higher elasticity when the cutting insert **150** is inserted into the insert pocket **104**. Since the cutting tool holder blade **100** is formed of hard metal, it is desirable to allow the clamping jaw **110** to withstand elastic deformation as much as possible, while preventing breakage and cracks in the holder blade **100**, e.g. adjacent the clamping jaw **110**.

[019] It would be appreciated that any one of the base jaw abutment surface **108**, the clamping surface **112** and the insert stop surface **114**, may be formed as a V-shaped surface. In order to

form a V-shaped surface, that surface must be ground in the desired direction. Making the first minimum longitudinal distance **D1** smaller than the second minimum longitudinal distance **D2** allows for safer grinding of the base jaw abutment surface **108**. When a grinding wheel is entered into the insert pocket **104** in order to grind the base jaw abutment surface **108**, there is sufficient space in the front extremity portion **118** of the curved inner surface **116**, for the grinding wheel to avoid contact with the clamping jaw **110** at the curved inner surface **116**. In this manner, possible damage to the clamping jaw **110** by the grinding wheel may be avoided.

[020] According to the embodiment shown in Figures 1-6, the cutting tool holder blade **100** is mirror symmetric about the mid-plane **P**. Thus, the insert clamping portion **102** has two identical mirrored insert pockets **104** located on opposite sides of the mid-plane **P**. The inner extremity portions **120** of the curved inner surface **116** of both insert pockets **104** in the same insert clamping portion **102** are spaced apart by a minimum transverse distance **H**, as indicated in Figure 2. The minimum transverse distance **H** is the shortest transverse distance between any portions of the curved inner surfaces **116** of both insert pockets **104** (i.e., in a direction perpendicular to the mid-plane **P**). A third longitudinal distance **D3** (Figure 2) extends between the inner extremity portion **120** and the front plane **F**. According to this embodiment of the present invention, the minimum transverse distance **H** is greater than the third longitudinal distance **D3**. In a particular case, the minimum transverse distance **H** may be at least twice the third longitudinal distance **D3**.

[021] The front surface **122** may have a central indented portion **124**, curving away from the front plane **F** into the cutting tool holder blade. A fourth longitudinal distance **D4** extends between the innermost portion of the indented portion **124** and the front plane **F** (Figure 2). The fourth longitudinal distance **D4** is the largest longitudinal distance between any portion of the front surface **122** and the front plane **F**. This curved indent in the front surface **122** adjacent the resilient clamping jaws **110** narrows the clamping jaws **110** in the vicinity of the mid-plane **P**. In this manner, each of the clamping jaws **110** is further flexible, and amenable to elastic deformation when clamping the cutting insert **150**.

[022] With particular reference to Figures 5 and 6, the cutting insert **150** is mounted into the insert pocket **104**, for example, from its position shown in Figures 5 and 6, towards the mid-plane **P**, until reaching the mounted position shown in Figure 1. The cutting insert **150** has a cutting portion **152** and a locating portion **154**. The cutting portion **152** has a cutting edge **156**

formed at the intersection of a rake surface **158** and a relief surface **160**. The cutting insert **150** further has an upper surface **162**, a lower surface **164** and a peripheral side surface **166** extending therebetween.

[023] The locating portion **154** extends from the cutting portion **152** away from the upper surface **162**. The locating portion **154** has opposing forward and rear locating surfaces **168, 170**, with the forward locating surface **168** located in the lower surface **164**. The peripheral side surface **166** includes opposing forward and rear surfaces **172**, **174** and opposing side surfaces **176** extending therebetween. The relief surface **160** is located in the forward surface **172**, and the rake surface **158** is located in the upper surface **162**. The rear locating surface **170** is located in the rear surface **174**. In addition, a lower locating surface **178** is located in the lower surface **164** and opposing the upper surface **162**, and extending between the forward surface **172** and the forward locating surface **168**.

[024] When the cutting insert **150** is mounted into the insert pocket **104**, the base jaw abutment surface **108** of the base jaw **106** abuts the rear surface **174** of the cutting insert **150**. The clamping surface **112** of the clamping jaw **110** abuts the forward locating surface **168** of the cutting insert **150**. The insert stop surface **114** of the clamping jaw **106** abuts the lower locating surface **178** of the cutting insert **150**.

[025] With reference to Figures 7 and 8, another cutting tool **141** is shown, according to a second embodiment of the present invention, including a cutting tool holder blade **101** and a cutting insert **150**. The cutting tool holder blade **101** is similar to the cutting tool holder blade **100**, having only two insert pockets **104**, located in opposite corners of the rectangle. As such, the holder blade **101** has 180° rotational symmetry about a central axis **C** which is perpendicular to the longitudinal axis **A** and lies on the mid-plane **P**, but lacks mirror symmetry about the mid-plane **P**. As indicated in Figure 8, for each of the insert pockets **104** of the cutting tool holder blade **101**, the first minimum longitudinal distance **D1** is smaller than the second minimum longitudinal distance **D2**, as in the cutting tool holder blade **100**.

[026] The cutting tool holder blade **100, 101** may further have a through hole **126** adjacent each of the insert pockets **104**. Each through hole **126** is adapted to receive a respective member of an actuating key, which serves to advance the cutting insert **150** into and out of the insert pocket **104**. Another member of the actuating key is configured to fit simultaneously either into the insert pocket **104**, adjacent the curved inner surface **116**, or above the upper surface **162** of

the cutting insert **150**. The actuating key is configured to advance the cutting insert **150** into the insert pocket **104**, when the other member is located above the upper surface **162** and the key is rotated in a first direction, and to extract the cutting insert **150**, when the other member is located adjacent the curved inner surface **116** and the key is rotated in an opposite direction.

[027] It would be appreciated that since the cutting tool holder blade **100, 101** is formed of hard metal, it is more durable than steel, for example, in terms of durability to heat during metal cutting. Since hard metal is durable to the heat formed during metal cutting, there is no need for an external or internal arrangement for applying coolant fluid to the cutting area of the cutting tool, making the holder blade **100**, **101** less complicated and easier to manufacture.

[028] In addition, a cutting tool having a hard metal holder blade, such as holder blade **100**, **101** is more stabile and less prone to vibrate during metal cutting operations. This improves the cutting tool life and total possible time of operation. When the cutting tool holder blade is more stabile, it may also provide for deeper turning depth of the turning cutting tool.

[029] In the cutting tool **140**, **141**, the cutting insert **150** may be replaced when worn, or after a predetermined period of operation time. It would be appreciated that in the hard metal cutting tool holder blade **100**, **101**, the resilience and elasticity of the clamping jaw **110** is unlikely to be impaired over time and repeated use (i.e., which may happen in a steel holder blade, for example).

[030] While the present invention has been described with reference to one or more specific embodiments, the description is intended to be illustrative as a whole and is not to be construed as limiting the invention to the embodiments shown. It is appreciated that various modifications may occur to those skilled in the art that, while not specifically shown herein, are nevertheless within the scope of the invention.

CLAIMS

1. A cutting tool holder blade (100, 101) having opposite ends (136) and a longitudinal mid-axis (A) lying on a mid-plane (P) and extending between the opposite ends (136), the cutting tool holder blade (100, 101) comprising:

at least one insert clamping portion (102) with a front plane (F) perpendicular to the mid-plane (P), the insert clamping portion (102) having at least one insert pocket (104), the insert pocket (104) comprising:

a base jaw (106) having a base jaw abutment surface (108);

a clamping jaw (110) resiliently connected to the base jaw in a unitary one-piece construction, the clamping jaw (110) having a clamping surface (112) facing opposite the base jaw abutment surface (108) and an insert stop surface (114); and

a curved inner surface (116) extending from the base jaw abutment surface (108) towards and along the clamping jaw (110), the curved inner surface (116) having a front extremity portion (118),

wherein:

the holder blade (100, 101) is formed of hard metal, and

a first minimum longitudinal distance (D1) between the front extremity portion (118) and the front plane (F) is smaller than a second minimum longitudinal distance (D2) between the clamping surface (112) and the front plane (F).

2. The cutting tool holder blade (100) according to claim 1, wherein:

the cutting tool holder blade (100) is mirror-symmetric about the mid-plane (P) with the at least one insert clamping portion (102) having two insert pockets (104) located on opposite sides of the mid-plane (P),

the curved inner surface (116) has an inner extremity portion (120), spaced apart from the front extremity portion (118), with a minimum transverse distance (H) extending between the inner extremity portions (120) of both insert pockets (104) in the same insert clamping portion (102),

a third longitudinal distance (D3) extends between the inner extremity portion (120) of each insert pocket (104) and the front plane (F), and

the minimum transverse distance (H) is greater than the third longitudinal distance (D3).

3. The cutting tool holder blade (100) according to claim 2, wherein the minimum transverse distance (H) is at least twice the third longitudinal distance (D3).

4. The cutting tool holder blade (100) according to any one of claims 2-3, wherein a front surface (122) extends away from the insert pocket (104) along the insert clamping portion (102), the front surface (122) having a central indented portion (124) indented away from the front plane (F) into the cutting tool holder blade.

5. The cutting tool holder blade (100, 101) according to any one of claims 1-4, wherein the cutting tool holder blade (100, 101) is formed of cemented carbide.

6. The cutting tool holder blade (101) according to any one of claims 1 and 5, wherein:

the holder blade has 180° rotational symmetry about a central axis (C) perpendicular to the longitudinal axis (A) and lies on the mid-plane (P), and

the holder blade lacks mirror symmetry about the mid-plane (P).

7. A cutting tool (140, 141) comprising:

a cutting tool holder blade (100, 101) according to any one of claims 1-6, and

a cutting insert (150) resiliently retained in one of the at least one insert pocket (104) of the cutting tool holder blade (100, 101).

8. The cutting tool (140, 141) according to claim 7, wherein:

the cutting insert (150) comprises:

a cutting portion (152) and a locating portion (154), the cutting portion (152) having a cutting edge (156) formed at the intersection of a rake surface (158) and a relief surface (160);

an upper surface (162), a lower surface (164) and a peripheral side surface (166) extending therebetween, the locating portion (154) extending from the cutting portion (152) away from the upper surface (162), the locating portion (154) having opposing forward and rear locating surfaces (168, 170), the forward locating surface (168) being located in the lower surface (164), the peripheral side surface (166) comprising:

opposing forward and rear surfaces (172, 174) and opposing side surfaces (176) extending between the forward and rear surfaces (172, 174), the relief surface (160) being located in the forward surface (172), the rake surface (158) being located in the upper surface (162), and the rear locating surface (170) being located in the rear surface (174); and

a lower locating surface (178) located in the lower surface (164) and opposing the upper surface (162), and extending between the forward surface (172) and the forward locating surface (168).

9. The cutting tool (140, 141) according to any one of claims 7-8, wherein:

the base jaw abutment surface (108) of the base jaw (106) abuts the rear surface (174) of the cutting insert (150),

the clamping surface (112) of the clamping jaw (110) abuts the forward locating surface (168) of the cutting insert (150), and

the insert stop surface (114) of the clamping jaw (106) abuts the lower locating surface (178) of the cutting insert (150).

10. The cutting tool (140, 141) according to any one of claims 7-9, wherein:

both the cutting tool holder blade (100, 101) and the cutting insert (150) are formed of cemented carbide; and

the cutting insert (150) is spaced apart from the front extremity portion (118) of the curved inner surface (116).

11. A cutting tool holder blade (100, 101) having opposite ends (136) and a longitudinal mid-axis (A) lying on a mid-plane (P) and extending between the opposite ends (136), the cutting tool holder blade (100, 101) comprising:

at least one insert clamping portion (102) having at least one insert pocket (104), the insert pocket (104) comprising:

a base jaw (106) having a base jaw abutment surface (108);

a clamping jaw (110) resiliently connected to the base jaw in a unitary one-piece construction, the clamping jaw (110) having a clamping surface (112) facing opposite the base jaw abutment surface (108) and an insert stop surface (114); and

a curved inner surface (116) extending from the base jaw abutment surface (108) towards and along the clamping jaw (110), the curved inner surface (116) having a front extremity portion (118),

wherein:

the holder blade (100, 101) is formed of hard metal;

the at least one insert clamping portion (102) has a front plane (F) extending perpendicular to the mid-plane (P), the front plane (F) passing through a forwardmost portion of a front surface (122) of the at least one insert clamping portion (102); and

the clamping surface (112) overhangs the front extremity portion (118) of the curved inner surface (116), in a direction towards the base jaw (106) and away from the front plane (F).

12. The cutting tool holder blade (100) according to claim 11, wherein:

the cutting tool holder blade (100) is mirror-symmetric about the mid-plane (P) with the at least one insert clamping portion (102) having two insert pockets (104) located on opposite sides of the mid-plane (P),

the curved inner surface (116) has an inner extremity portion (120), spaced apart from the front extremity portion (118), with a minimum transverse distance (H) extending between the inner extremity portions (120) of both insert pockets (104) in the same insert clamping portion (102),

a third longitudinal distance (D3) extends between the inner extremity portion (120) of each insert pocket (104) and the front plane (F), and

the minimum transverse distance (H) is greater than the third longitudinal distance (D3).

13. The cutting tool holder blade (100) according to any one of claims 11-12, wherein the minimum transverse distance (H) is at least twice the third longitudinal distance (D3).

14. The cutting tool holder blade (100) according to any one of claims 11-13, wherein the front surface (122) has a central indented portion (124) indented away from the front plane (F) into the cutting tool holder blade.

15. The cutting tool holder blade (100, 101) according to any one of claims 11-14, wherein the hard metal comprises cemented carbide.

16. The cutting tool holder blade (101) according to any one of claims 11 and 15, wherein:

the holder blade has 180° rotational symmetry about a central axis (C) perpendicular to the longitudinal axis (A) and lying on the mid-plane (P), and

the holder blade lacks mirror symmetry about the mid-plane (P).

17. A cutting tool (140, 141) comprising:

a cutting tool holder blade (100, 101) according to any one of claims 11-16, and

a cutting insert (150) resiliently retained in the at least one insert pocket (104) of the cutting tool holder blade (100, 101); wherein:

both the cutting tool holder blade (100, 101) and the cutting insert (150) are formed of cemented carbide; and

the cutting insert (150) is spaced apart from the front extremity portion (118) of the curved inner surface (116).

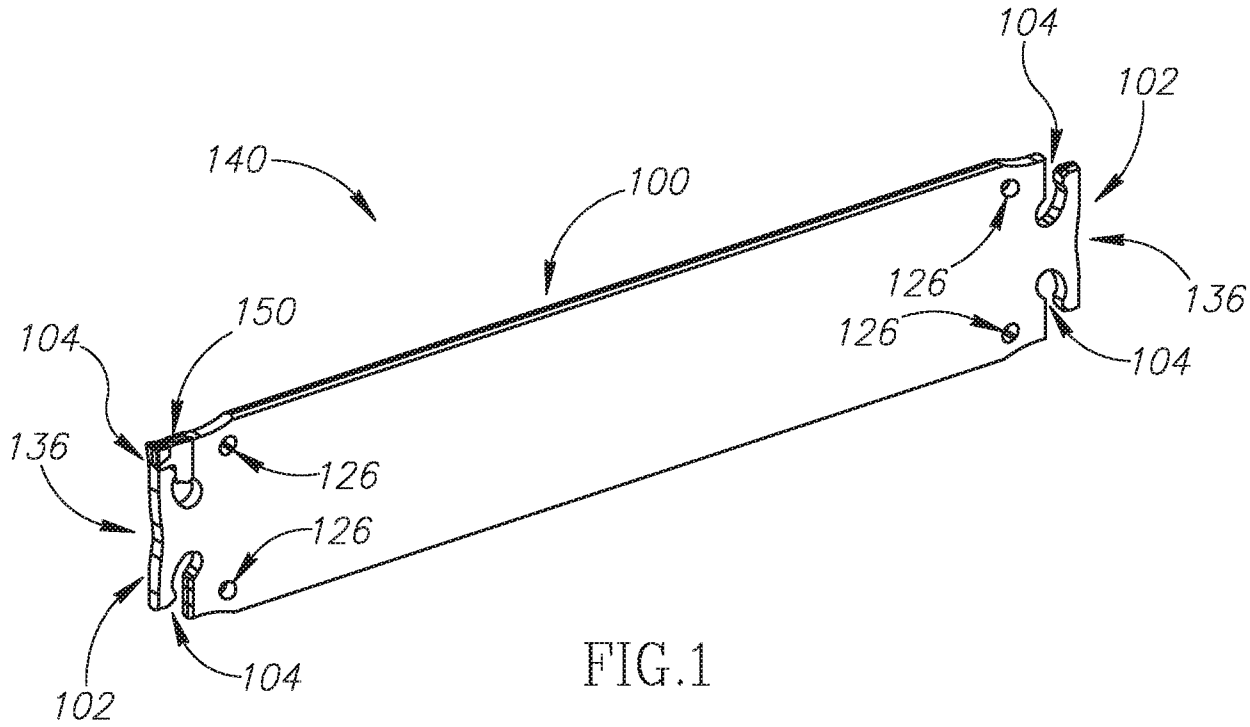

104
102
140
100
126
136
150
104
126
126
104
136
126
104
102

FIG.1

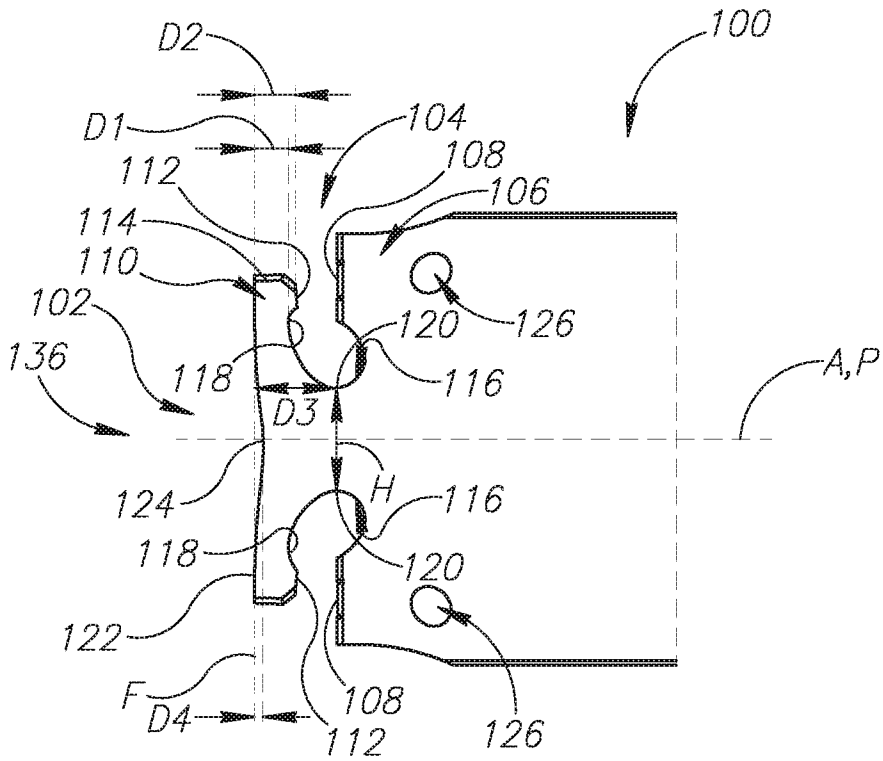

D2
100
D1
104
108
112
106
114
110
102
120
126
136
118
116
A,P
D3
124
H
116
118
120
122
F
D4
108
112
126

FIG.2

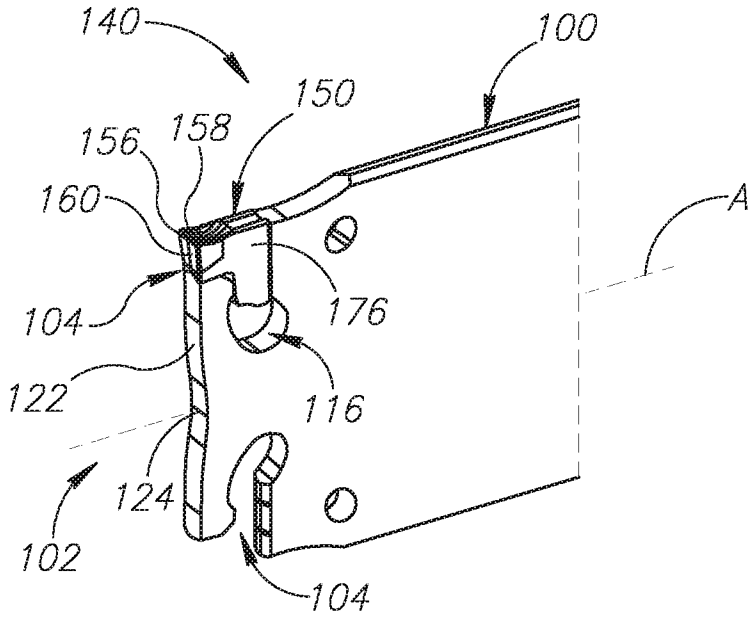

140
100
150
156
158
160
A
104
176
122
116
124
102
104

FIG.3

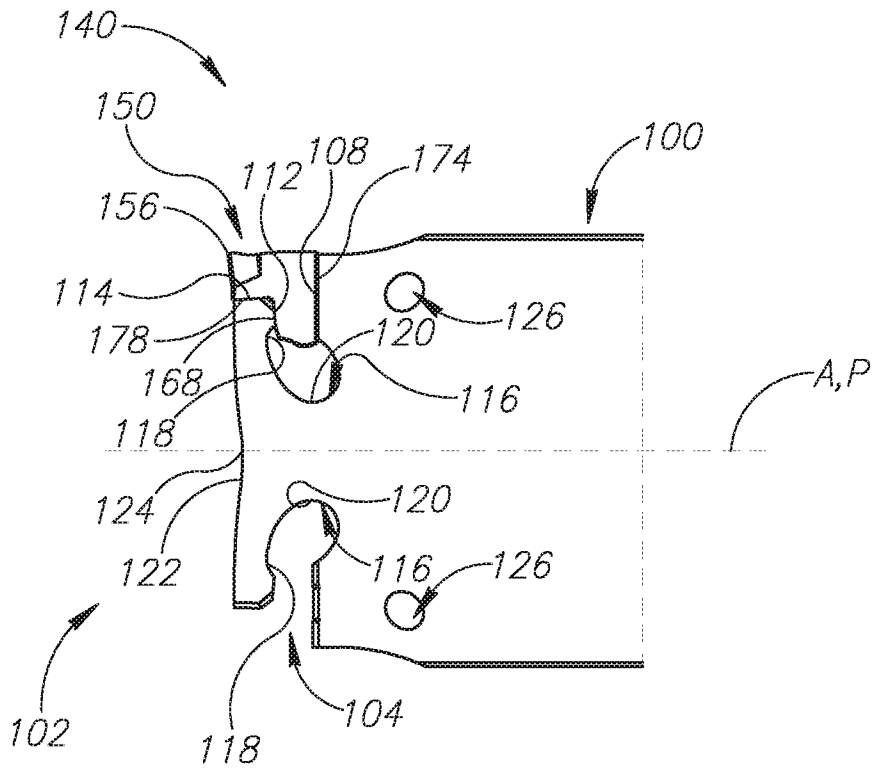

140
150
112
108
174
100
156
114
126
178
120
168
116
A,P
118
124
120
122
116
126
102
118
104

FIG.4

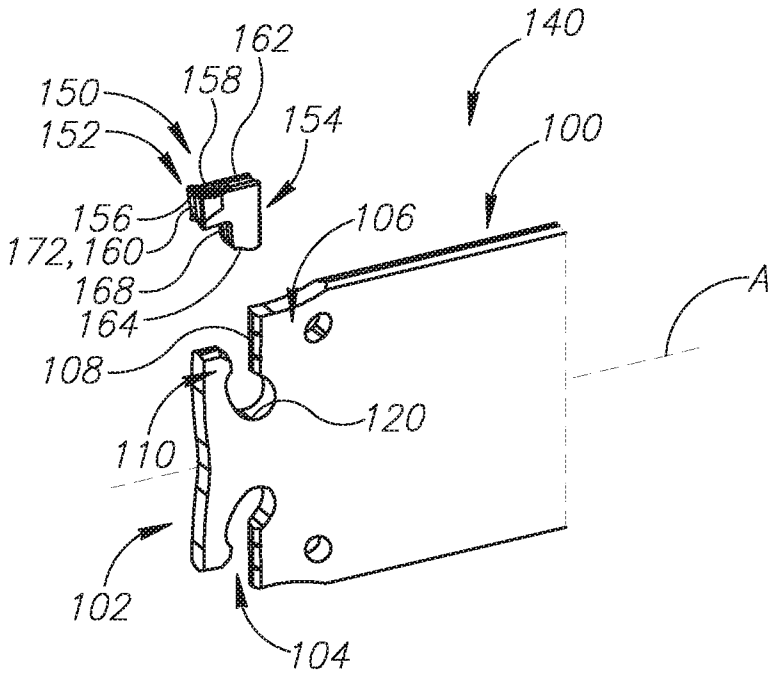

140
162
158
150
154
152
100
156
106
172,160
168
A
164
108
120
110
102
104

FIG.5

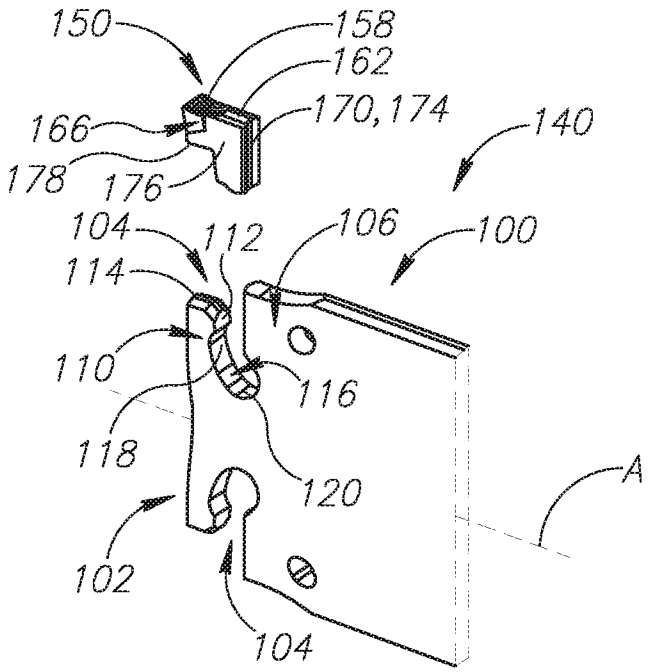

150
158
162
166
170,174
140
178
176
104
112
106
100
114
110
116
118
120
A
102
104

FIG.6

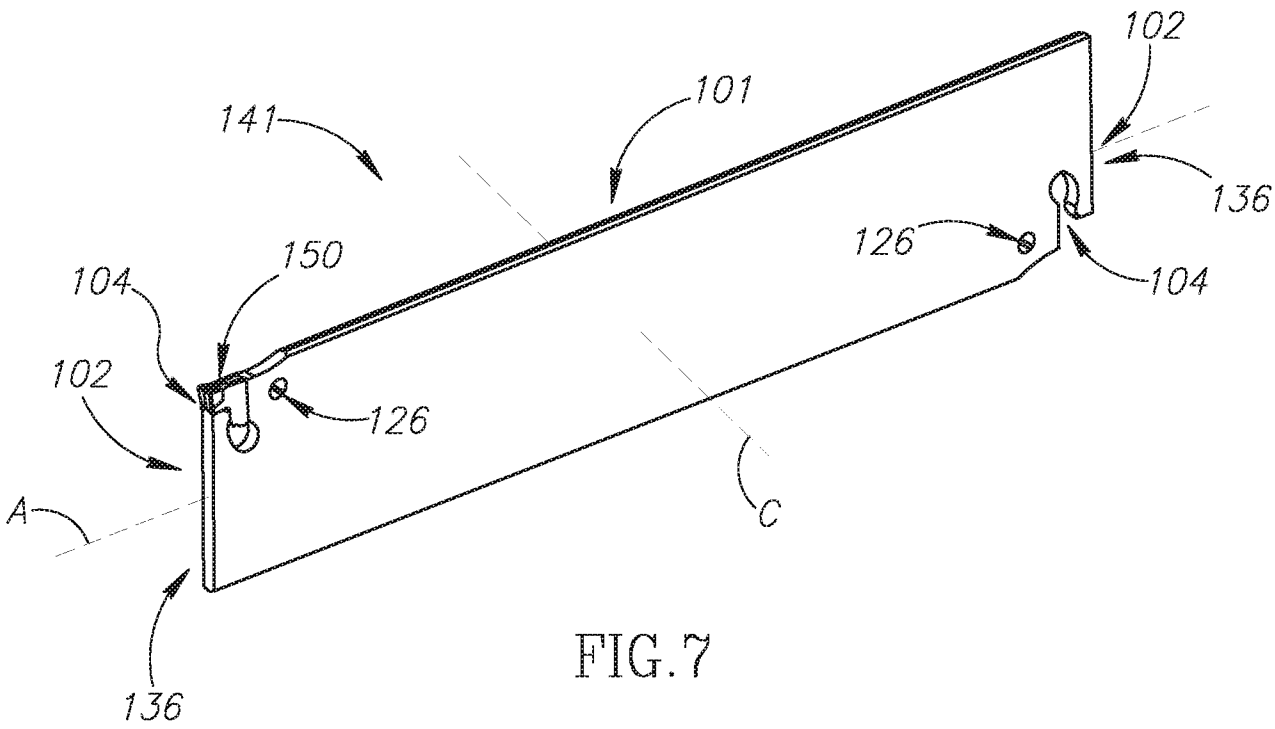

102
101
141
136
126
104
150
104
102
126
A
C
136

FIG.7

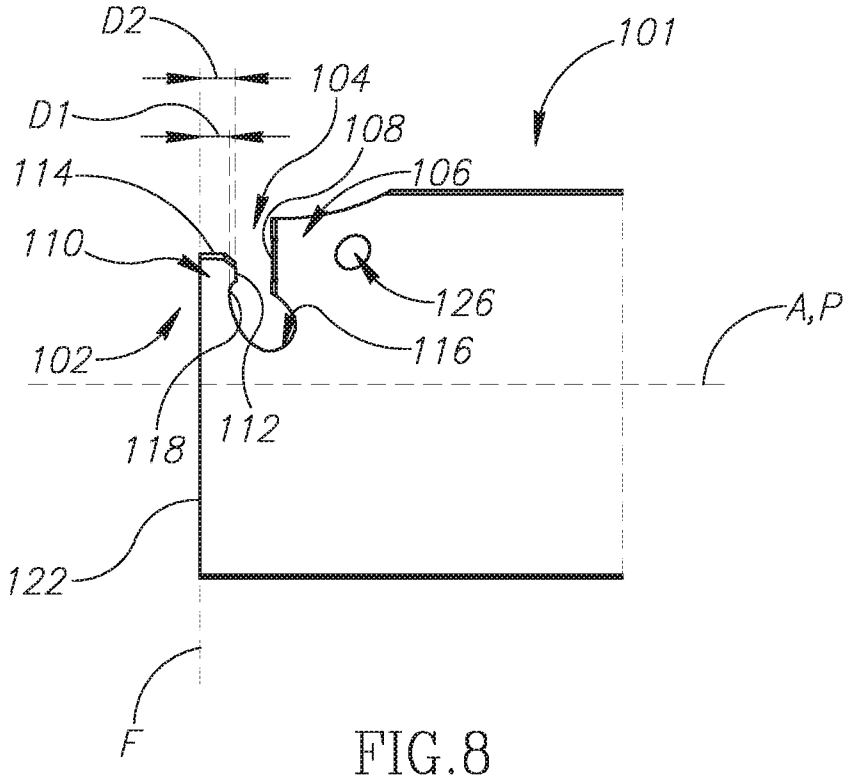

D2
101
104
D1
108
114
106
110
126
A,P
102
116
118
112
122
F

FIG.8

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2014/050565

A. CLASSIFICATION OF SUBJECT MATTER
INV. B23B27/08 B23B29/04 B23B29/14
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)
B23B

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.
Y	JP H04 112705 U (N/A) 30 September 1992 (1992-09-30) figure 1	1,5-11, 15-17
Y	JP H08 215904 A (SUMITOMO ELECTRIC INDUSTRIES) 27 August 1996 (1996-08-27) abstract; figures	1,5-11, 15-17
A	US 2011/158756 A1 (ATHAD SHIMON [IL]) 30 June 2011 (2011-06-30) paragraph [0046] paragraph [0052]; figure 6	17
A	US 5 054 967 A (NOGUCHI KAZUO [JP] ET AL) 8 October 1991 (1991-10-08) cited in the application column 3, line 34 - line 35; figure 3 column 4, line 3 - line 17	1-17

-/--

[X] Further documents are listed in the continuation of Box C.

[X] 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	Date of mailing of the international search report
7 October 2014	21/10/2014

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	Barrow, Jeffrey

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2014/050565

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98/52711 A1 (SANDVIK AB [SE]) 26 November 1998 (1998-11-26) page 4, line 20 - line 24; figures -----	1-17

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IL2014/050565

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP H04112705 U	30-09-1992	NONE	
JP H08215904 A	27-08-1996	NONE	
US 2011158756 A1	30-06-2011	CN 102665975 A	12-09-2012
		EP 2519370 A1	07-11-2012
		IL 203014 A	24-03-2013
		JP 2013515620 A	09-05-2013
		KR 20120105488 A	25-09-2012
		US 2011158756 A1	30-06-2011
		WO 2011080734 A1	07-07-2011
US 5054967 A	08-10-1991	DE 3864075 D1	12-09-1991
		EP 0291933 A1	23-11-1988
		KR 920008174 Y1	14-11-1992
		US 4909677 A	20-03-1990
		US 5054967 A	08-10-1991
WO 9852711 A1	26-11-1998	DE 69813795 D1	28-05-2003
		DE 69813795 T2	29-01-2004
		EP 0983130 A1	08-03-2000
		JP 2001525735 A	11-12-2001
		SE 9701900 A	23-11-1998
		US 6113319 A	05-09-2000
		WO 9852711 A1	26-11-1998