

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
14 May 2009 (14.05.2009)

PCT

(10) International Publication Number
WO 2009/061109 A1

(51) International Patent Classification:
B22F 7/00 (2006.01)

(21) International Application Number:
PCT/KR2008/006480

(22) International Filing Date:
4 November 2008 (04.11.2008)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:
10-2007-0114352
9 November 2007 (09.11.2007) KR

(71) Applicant (for all designated States except US): **ILJIN DIAMOND CO., LTD.** [KR/KR]; 614-2 Oryu-ri Daeso-myeon, Eumseong-gun, Chungcheongbuk-do 369-824 (KR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **OH, Jeang Ook**

[KR/KR]; 407-801 Imgwang Apt., Jeongja-dong Bundang-gu, Seongnam-city, Gyeonggi-do 463-787 (KR). **PARK, Byong Joon** [KR/KR]; 308-1002 Ochang Koa-roo Apt. 645-1, Gakri, Ochang-eup, Cheongwon-gun, Chungcheongbuk-do 363-783 (KR). **CHOI, Dong Ik** [KR/KR]; 1334-1, Deokjindong 1-ga, , Deokjin-gu, Jeonju-city Jeollabuk-do 561-191 (KR).

(74) Agent: **Y.P. LEE, MOCK & PARTNERS**; 1575-1 Seocho-dong, Seocho-gu, Seoul 137-875 (KR).

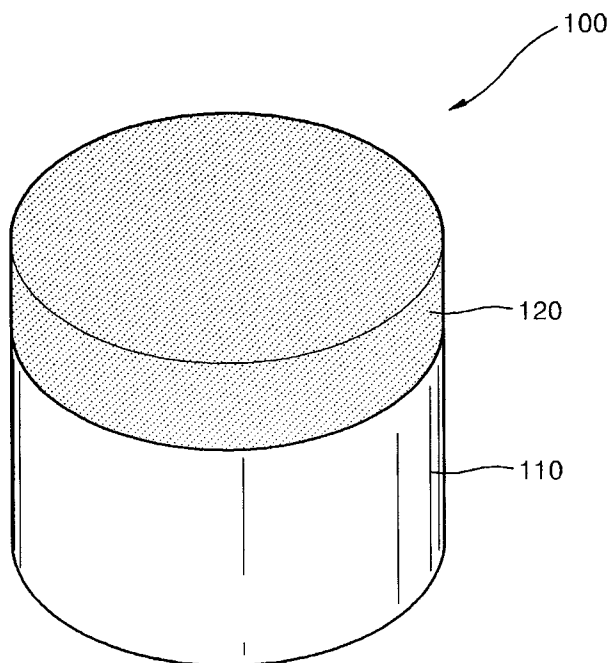
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, 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,

[Continued on next page]

(54) Title: EXCAVATING TOOL INSERT

FIG. 1



(57) Abstract: Provided is an excavating tool insert including: a support member having a first hardness and a first surface; and a super hard layer that is coupled to the first surface of the support member and has a second hardness that is greater than the first hardness, wherein the first surface of the support member comprises an identification mark that is embossed or engraved, and the super hard layer is formed to adhere to the first surface of the support member. Accordingly, the excavating tool insert can be easily identified even when the surface of the excavating tool insert is worn away due to cutting or excavating operations.

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GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

EXCAVATING TOOL INSERT

TECHNICAL FIELD

5 The present invention relates to an excavating tool insert, and more particularly, to an excavating tool insert which can be still easily identified even when a surface of the excavating tool insert is worn away.

BACKGROUND ART

10 An excavating tool insert is coupled to a tool assembly that is used in excavating oil wells or in cutting works to excavate rock beds that are underground or to cut metals or other materials. In general, a plurality of excavating tool inserts are mounted to a cutting tool for use.

 An excavating tool insert includes a pillar-shaped support member and a super
15 hard layer formed at an end of the support member. The support member may be formed by sintering a tungsten-based material. In order to form the super hard layer on the support member, a powder material for a super hard layer, such as diamond, is put into a mold and the support member is also put into the mold, and both are sintered in a
20 sintering furnace at a high temperature and a high pressure to couple the support member and the super hard layer as a single unit.

 An identification mark is marked on an outer surface of the excavating tool insert so that the manufacturer, the standards, and components, or the like, of the excavating tool insert can be displayed to the user. The excavating tool insert can cut rock beds and so forth as the outer circumferential surface of the super hard layer contacts the rock
25 beds and cuts the same as the excavating tool rotates during a cutting operation. With time, the excavating tool insert is worn away.

 As a result, the identification mark marked on the outer surface of the excavating tool insert disappears due to abrasion. If the identification mark is rubbed out, the exact characteristics of the excavating tool insert cannot be identified, and problems may occur
30 in selecting a proper replacement excavating tool insert.

DETAILED DESCRIPTION OF THE INVENTION

TECHNICAL PROBLEM

The present invention provides an excavating tool insert which can be still easily identified even when the surface of the excavating tool insert is worn away.

5

TECHNICAL SOLUTION

According to an aspect of the present invention, there is provided an excavating tool insert including: a support member having a first hardness and a first surface; and a super hard layer that is coupled to the first surface of the support member and has a second hardness that is greater than the first hardness, wherein the first surface of the support member comprises an identification mark that is embossed or engraved, and the super hard layer is formed to adhere to the first surface of the support member.

The identification mark may be formed to identify the manufacture year, standards, the name of the company, or the estimated usable period of the excavating tool insert.

The identification mark may include a number.

The identification mark may include a letter.

The identification mark may include a geometrical figure.

The identification mark may include the brand name or the logo of the company.

20

ADVANTAGEOUS EFFECTS

According to the present invention, the excavating tool insert includes an identification mark carved in an interface between the support member and the super hard layer, and thus, even when a surface of the excavating tool insert is worn away, the product information of the excavating tool insert can be easily identified.

25

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating an excavating tool insert according to an embodiment of the present invention;

FIG. 2 is an exploded perspective view of the excavating tool insert of FIG. 1, a support member and a super hard layer of the excavating tool insert being separate from each other;

FIG. 3 is a cross-sectional view taken along a line III-III of FIG. 2;

FIG. 4 is an exploded perspective view of an excavating tool insert according to

30

another embodiment of the present invention;

FIG. 5 is a cross-sectional view taken along a line V-V of FIG. 4; and

FIGS. 6A, 6B, and 6C are plan views illustrating excavating tool inserts according to other embodiments of the present invention.

5

BEST MODE

The present invention will now be described more fully with reference to the accompanying drawings, in which exemplary embodiments of the invention are shown.

FIG. 1 is a perspective view illustrating an excavating tool insert 100 according to an embodiment of the present invention, FIG. 2 is an exploded perspective view of the excavating tool insert 100 of FIG. 1, a support member 110 and a super hard layer 120 of the excavating tool being separate from each other, and FIG. 3 is a cross-sectional view taken along a line III-III of FIG. 2.

Referring to FIG. 1, the excavating tool insert 100 includes a support member 110 and a super hard layer 120.

The support member 110 is pillar-shaped, and has a first surface 111. Referring to FIGS. 1 and 2, the support member 110 is cylinder-shaped; however the present invention is not limited thereto, and thus, the support member 110 can have other various pillar shapes. The first surface 111 is coupled to the super hard layer 120.

The first surface 111 includes an identification mark 112. The identification mark 112 is engraved. The identification mark 112 may display the manufacture year, the name of the company, or the estimated usable period of the excavating tool insert 100.

The support member 110 may be formed of a carbide alloy containing tungsten (W), tantalum (Ta), vanadium (V), titanium (Ti), etc. Also, a binder may be included in the support member 110 so that materials to be sintered can be easily bonded to each other. Examples of the binder include cobalt (Co), iron (Fe), nickel (Ni), etc.

For example, the support member 110 may include cobalt-based tungsten carbide (WC-Co) alloy. The support member 110 may be formed by sintering a cobalt-based tungsten carbide material. For the sintering operation, a cobalt-based tungsten carbide material may be put into a mold and sintered.

A mark equal to the identification mark 112 is embossed on the mold. Thus, the support member 110 is fixed in the mold and sintered, and then the identification mark 112 is finally engraved in the first surface 111 with the form of the mold.

Alternatively, the identification mark 112 may be formed after the sintering operation. After sintering the support member 110, the first surface 111 of the support member 110 may be etched to form the engraved identification mark 112.

The super hard layer 120 is coupled to the first surface 111 of the support member 110. The super hard layer 120 may include diamond or cubic boron nitride. The super hard layer 120 may particularly include polycrystalline diamond to increase its hardness. The super hard layer 120 is formed of a material having greater rigidity than the support member 110 so as to conduct cutting or excavating operations.

A powder material for forming the super hard layer 120 is put into a mold. Then the support member 110 is put into the mold such that the first surface 111, which is to be coupled to the super hard layer 120, contacts a material for forming the super hard layer 120. Then the materials for forming the super hard layer 120 are sintered at a high temperature and a high pressure so as to adhere to the first surface 111 of the support member 110 and fill into the engraved identification mark 112.

Here, the sintering operation may be conducted at a high temperature and a high pressure of up to 1500°C and 6 GPa. In order to maintain such a high temperature and high pressure, the mold into which the above-described support member 110 and the super hard layer 120 are input is sealed using a large sealing cell to perform the sintering operation. After the sintering operation is completed, the mold on the outer circumference of the excavating tool insert 100 and the sealing cell are removed, and processed for use.

The excavating tool insert 100 is coupled to an excavating tool so as to conduct a cutting operation or conduct an excavating operation while contacting rock beds. With time, the support member 110 and the super hard layer 120 need to be replaced because of abrasion caused by contact with the rock beds and so forth. For easy replacement, the brand name, the manufacturer, the standards, and so forth of the excavating tool insert 100 are marked on the outer circumferential surface of the excavating tool insert 100.

However, the outer circumferential surface of the excavating tool insert 100 is worn away due to repeated cutting operations, and the brand name, the manufacturer, the standards, and so forth marked on the outer circumferential surface of the excavating tool insert 100 disappear. Accordingly, it is not easy to identify the type, the characteristics, and the standards of the excavating tool insert 100 attached to the

excavating tool over a predetermined period of time.

However, the excavating tool insert 100 according to the current embodiment of the present invention has the identification mark 112 marked on the first surface of the support member 110. Also, the first surface 111 of the support member 110 is bonded
5 to the super hard layer 120, and thus, the identification mark 112 is not exposed during the cutting operation and the identification mark 112 is not rubbed out even after repeated cutting operations. As a result, the characteristics of the excavating tool insert 100 can be easily determined and identified.

The identification mark 112 of the excavating tool insert 100 is not exposed to the
10 outside and thus cannot be distinguished with human eyes. The identification mark 112 of the excavating tool insert 100 may be identified by a non-destructive inspection method. For example, the identification mark 112 of the excavating tool insert 100 may be identified by ultrasonic wave inspection; in detail, the identification mark 112 formed in the first surface 112 of the support member 110 may be identified using a c-scan
15 method. In the present embodiment, the identification mark 112 formed in the first surface 112 of the support member 110 may be identified using a c-scan method; however, the present invention is not limited thereto, and thus, the first surface 112 of the support member 110 can be identified with other various non-destructive inspection methods.

20 FIG. 4 is an exploded perspective view of an excavating tool insert 200 according to another embodiment of the present invention. FIG. 5 is a cross-sectional view taken along a line V-V of FIG. 4.

Referring to FIG. 4, the excavating tool insert 200 includes a support member 210 and a super hard layer 220.

25 The support member 210 is pillar-shaped, and has a first surface 211 that is bonded to the super hard layer 220.

The first surface 211 includes an identification mark 212 that is embossed. The identification mark 212 may display the manufacture year, the company name, or the estimated usable period of the excavating tool insert 200.

30 The support member 210 may be formed of a carbide alloy containing tungsten (W), tantalum (Ta), vanadium (V), titanium (Ti), etc. Also, a binder may be included in the support member 210 so that materials to be sintered can be easily bonded to each other. Examples of the binder include cobalt (Co), iron (Fe), nickel (Ni), etc.

For example, the support member 210 may include a cobalt-based tungsten

carbide (WC-Co) alloy. The support member 210 may be formed by sintering a cobalt-based tungsten carbide material. For the sintering operation, a cobalt-based tungsten carbide material may be put into a mold and sintered.

5 A mark equal to the identification mark 212 is engraved in the mold. Thus, the support member 210 is fixed in the mold and sintered, and then the identification mark 212 is finally embossed in the first surface 211 with the form of the mold.

Alternatively, the identification mark 212 may be formed after the sintering operation. After sintering the support member 210, the first surface 211 may be etched, except for an area for forming the identification mark 212. Finally, the embossed
10 identification mark 212 can be formed.

The super hard layer 220 is coupled to the first surface 211 of the support member 210. The super hard layer 220 may also be formed of the materials of the above-described embodiment.

Powder materials for forming the super hard layer 220 are put into a
15 predetermined mold. Then the support member 210 is input to the mold such that the first surface 211, which is to be coupled to the super hard layer 220, contacts the materials for forming the super hard layer 220. The materials for forming the super hard layer 220 are sintered at a high temperature and a high pressure such that the materials for forming the super hard layer 220 adhere to the identification mark 212 and
20 are filled in a depressed portion of the first surface 211 formed due to the identification mark 212.

The excavating tool insert 200 according to the current embodiment of the present invention also includes the identification mark 212 formed in the first surface 211 of the support member 210, which is not exposed during cutting operations like the
25 previous embodiment. Accordingly, even after repeated cutting process or excavating operations on rock beds, etc., the identification mark 212 does not disappear. Also, the identification mark 212 can be identified using a non-destructive inspection method.

FIGS. 6A, 6B, and 6C are plan views illustrating excavating tool inserts according to other embodiments of the present invention. Here, for convenience of explanation,
30 only a first surface 311 of a support member 310 is illustrated.

An identification mark 312 may be formed in the first surface 312 of the support member 310. The identification mark 312 may have various shapes as to the ones shown. As described above, the identification mark 312 may be embossed or engraved. The contents of the identification mark 312 may be letters, numbers, or marks, or a

combination thereof. That is, any contents that identify the excavating tool insert can be formed in various manners.

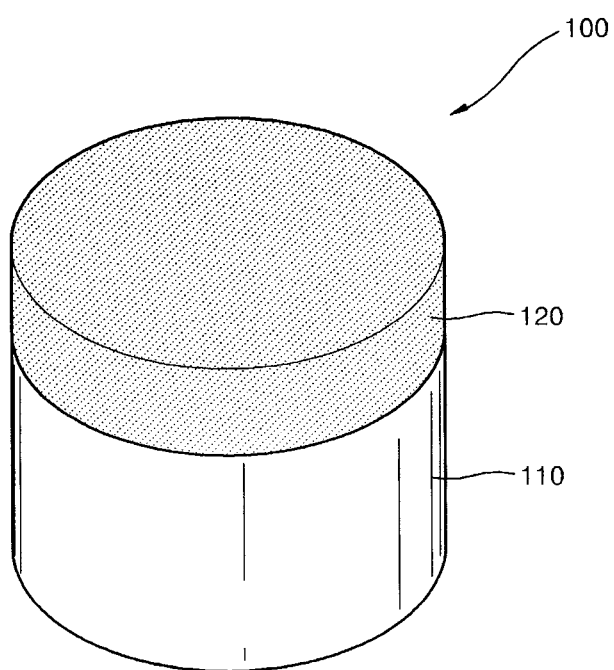
5 While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

CLAIMS

1. An excavating tool insert comprising:
a support member having a first hardness and a first surface; and
5 a super hard layer that is coupled to the first surface of the support member and
has a second hardness that is greater than the first hardness,
wherein the first surface of the support member comprises an identification mark
that is embossed or engraved, and the super hard layer is formed to adhere to the first
surface of the support member.
10
2. The excavating tool insert of claim 1, wherein the identification mark is
formed to identify the manufacture year, the standards, the name of the company, or the
estimated usable period of the excavating tool insert.
- 15 3. The excavating tool insert of claim 1, wherein the identification mark
comprises a number.
4. The excavating tool insert of claim 1, wherein the identification mark
comprises a letter.
20
5. The excavating tool insert of claim 1, wherein the identification mark
comprises a geometrical figure.
6. The excavating tool insert of claim 1, wherein the identification mark
25 comprises the brand name or the logo of the company.
7. The excavating tool insert of claim 1, wherein the super hard layer
comprises diamond or boron nitride.

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FIG. 1



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FIG. 2

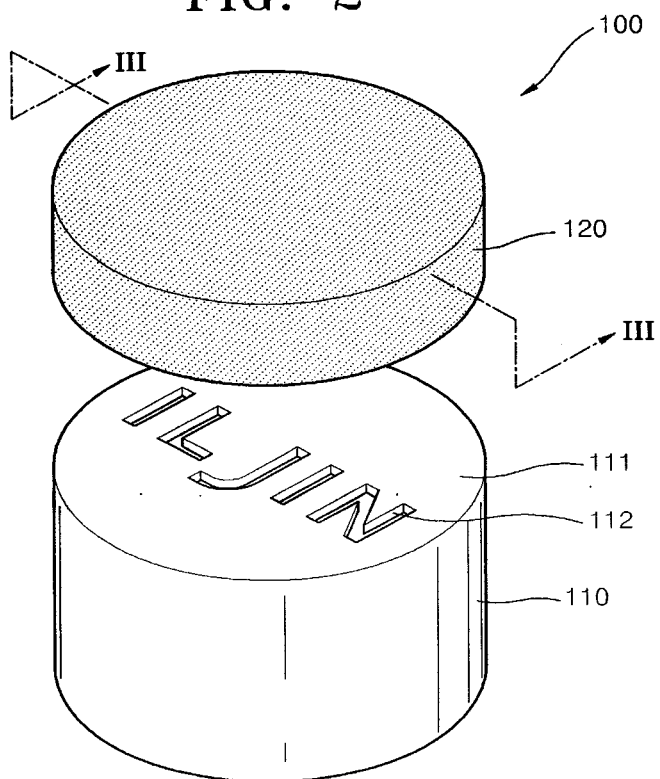


FIG. 3

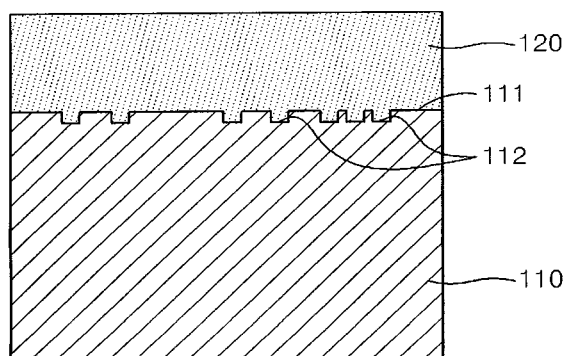


FIG. 4

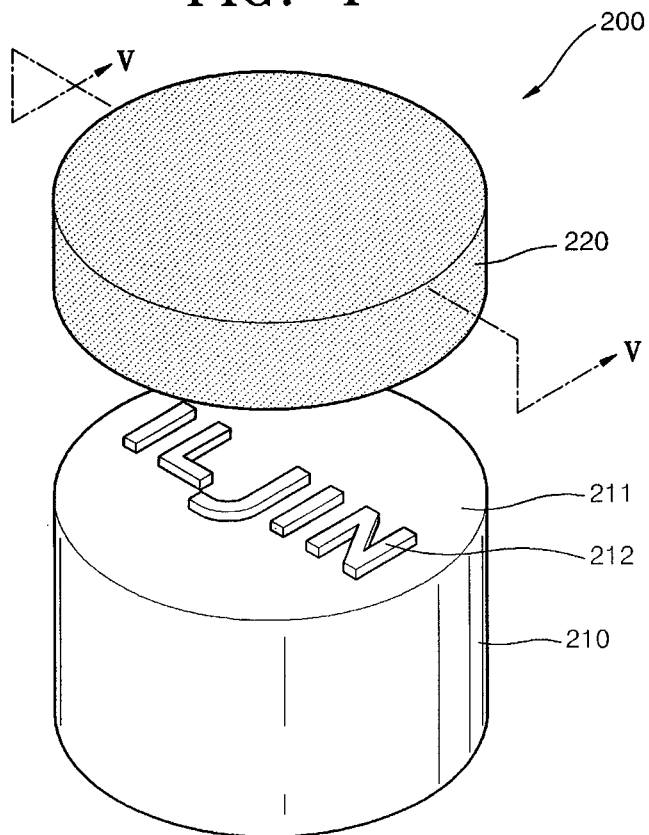


FIG. 5

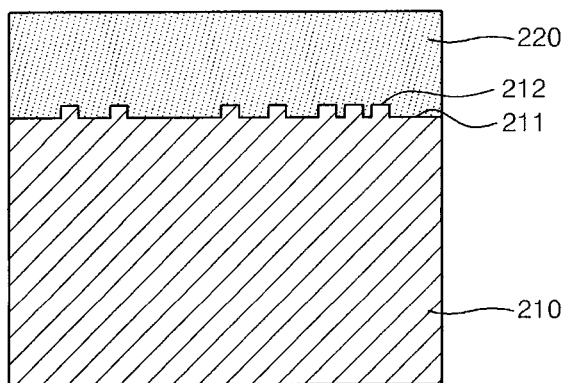


FIG. 6A

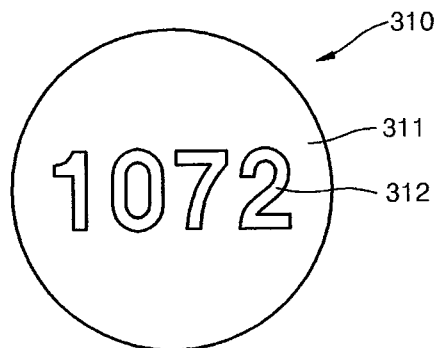


FIG. 6B

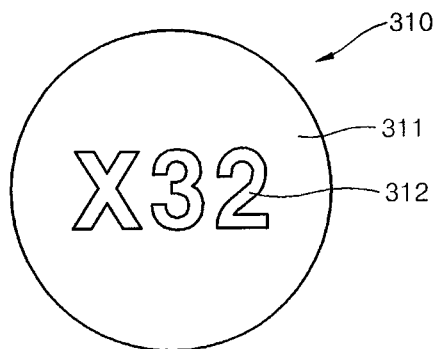
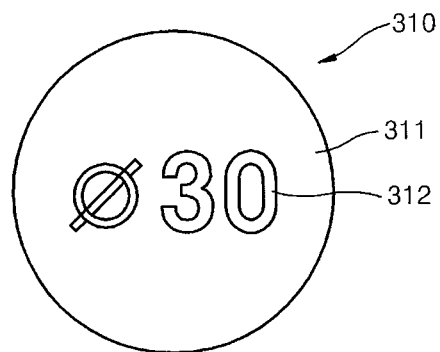


FIG. 6C



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2008/006480**A. CLASSIFICATION OF SUBJECT MATTER****B22F 7/00(2006.01)i**

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)

IPC B05D 1/00, B22F 7/00, B23B 27/16, B24D 3/00, B24D 3/04, B24D 5/00, B24D 17/00, B32B 9/00, B32B 15/00

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

Korean Utility models and applications for Utility models since 1975
Japanese Utility models and applications for Utility models since 1975

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

eKIPASS (KIPO internal) & keywords: identification mark, profile, excavating tool insert, and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6149695 A (MOOSA MAHOMED ADIA et al.) 21 November 2000 See the abstract; figures 1-10; column 1, lines 10-37, and claims 1-12	1-7
X	US 2004-0037948 A1 (KLAUS TANK et al.) 26 February 2004 See the abstract; figures 2, 3; and paragraphs 3, 22, 24, 28, 44, 47, 48	1-7
A	US 6123488 A (JAMES R. KASPERIK et al.) 26 September 2000 See the abstract; figures 1-10; and claim 1	1-7
A	US 2007-0042217 A1 (X. DANIEL FANG et al.) 22 February 2007 See the abstract; and figures 1-9	1-7

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search

25 MARCH 2009 (25.03.2009)

Date of mailing of the international search report

25 MARCH 2009 (25.03.2009)

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Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-
gu, Daejeon 302-701, Republic of Korea

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Authorized officer

LEE, SUNG JOON

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/006480

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