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[Continued on next page]

(54) Title: IN-SITU COMPOSITE FORMATION OF DAMAGE TOLERANT COATINGS UTILIZING LASER

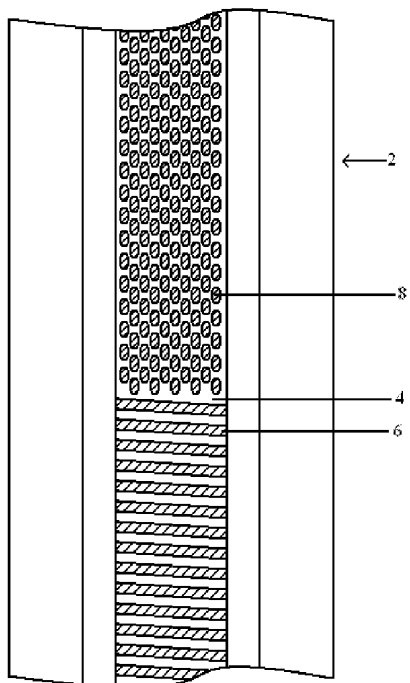


Fig. 1

(57) Abstract: A coating steel component with a pattern of an iron based matrix with crystalline particles metallurgically bound to the surface of a steel substrate for use as disc cutters or other components with one or more abrading surfaces that can experience significant abrasive wear, high point loads, and large shear stresses during use. The coated component contains a pattern of features in the shape of freckles or stripes that are laser formed and fused to the steel substrate. The features can display an inner core that is harder than the steel substrate but generally softer than the matrix surrounding the core, providing toughness and wear resistance to the features. The features result from processing an amorphous alloy where the resulting matrix can be amorphous, partially devitrified or fully devitrified.



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A. CLASSIFICATION OF SUBJECT MATTER
 INV. C23C30/00

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)
 C23C C22C B23P

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/058927 A (BOLTON JIMMIE BROOKS [US]; ROGERS BILLI MARIE [US]) 1 August 2002 (2002-08-01) page 7, lines 25,26 page 9, lines 1-15 page 11, lines 1-27 page 12, lines 11-11-34 page 13, lines 1-34 page 14, lines 1-3 claims 4,10	1,4-8
X	WO 2006/034054 A (BELASHCHENKO VLADIMIR E [US]) 30 March 2006 (2006-03-30) page 27, lines 1-15 page 32, lines 5,6 page 33, lines 9,10 page 37, lines 8,9 claim 5	1-3,21, 22

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 document 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

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 800 891 A (WHITE A ET AL) 2 April 1974 (1974-04-02) abstract column 6, lines 10-57 claims 1,2; figures 2-4 -----	1,4-7, 20,23-27
A	US 2 833 638 A (OWEN ROBERT G) 6 May 1958 (1958-05-06) claim 1; figures 2,3 -----	1,4,5,7, 20,23, 24,26

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/052984

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-8, 20-27

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8, 20-27

A coated component comprising a steel substrate wherein an iron comprising matrix containing crystalline particles is metalurgically bound to said substrate and forms a discontinuous pattern.

2. claims: 9-19

A method to form a patterned coated steel component, comprising the steps of: providing a steel substrate; depositing a powder comprising an amorphous alloy onto a surface of said steel substrate; applying focused energy via a laser beam on a portion of said surface to liquefy said powder and contacting portion of said steel substrate; removing or reducing said focused energy from said portion of said surface to solidify said portion and form a pattern feature; and repeating the steps of applying, and removing until all pattern features are formed.

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 02058927	A	01-08-2002	NONE	
WO 2006034054	A	30-03-2006	EP 1797212 A1	20-06-2007
US 3800891	A	02-04-1974	NONE	
US 2833638	A	06-05-1958	NONE	