

(19)



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(11)

EP 1 167 562 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

02.01.2002 Bulletin 2002/01

(51) Int Cl.7: **C22C 38/22, C22C 38/24**

(21) Application number: **01114968.9**

(22) Date of filing: **20.06.2001**

(84) Designated Contracting States:

**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**

Designated Extension States:

AL LT LV MK RO SI

(30) Priority: **21.06.2000 IT MI001402**

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(54) **Alloy for making a special steel for cold-working tools**

(57) An alloy for making a special steel for cold-working tools comprises, alloyed with the iron, from 0.90 to 1.30 % by weight of carbon; from 7.0 to 8.5 % by weight of chromium; from 1.35 to 1.70 % by weight of

molybdenum; from 2.0 to 2.60 % by weight of vanadium; and from 0.80 to 1.40 % by weight of tungsten.

The alloy allows to make working tools having a higher efficiency and duration than those of similar tools made by conventional steels.

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an alloy for making a special steel for cold-working tools.

[0002] More specifically, the alloy according to the present invention can be used for making tools such as knife blades, molds, dies, punches and the like.

[0003] As is known from the prior art, the making of a given alloy starting from a combination of different materials strictly depends on the rate composition thereof, since even a very small variation of the latter is such as to provide the obtained alloy with unexpected characteristics.

[0004] Thus, a variation even of an individual component of the alloy forming mixture, and in particular, a variation of the dose thereof, can affect the mechanical properties of the alloy, in an actually unexpected manner for one skilled in the art.

[0005] In particular, in the field of the steels for cold-working operations, is known that these steels can have high wear resistance and toughness features, in other words, the material must properly resist against pulsed forces, such as dynamic loads, impacts and the like.

[0006] Also known is the fact that the toughness is a feature contrasting with the wear resistance.

[0007] Other two very important mechanical properties are the machinability and pressure resistance of the sharp corners.

[0008] The above mentioned features provide the working tool with a comparatively high efficiency.

[0009] Several prior documents have already disclosed conventional steel materials, made by a combination of different components and used in cold-working operations, which, however, are not provided with satisfactory toughness and mechanical resistance or strength properties.

SUMMARY OF THE INVENTION

[0010] Accordingly, the aim of the present invention is to provide a steel alloy, which can be used for cold-working operations, and which is provided both with very high wear resistance and toughness properties.

[0011] The above mentioned aim, as well as yet other objects, which will become more apparent hereinafter, are achieved by an alloy for making a special steel for cold working tools, characterized in that said alloy comprises, alloyed with the iron, from 0.90 to 1.30 % by weight of carbon; from 7.0 to 8.5 % by weight of chromium; from 1.35 to 1.70 % by weight of molybdenum; from 2.0 to 2.60 % by weight of vanadium; and from 0.80 to 1.40 % by weight of tungsten.

[0012] To the above mentioned composition, obtained by the above disclosed combination of materials in the disclosed doses, are advantageously added manganese, in an amount corresponding to from 0.3 to 0.5 %

by weight, and silicon, in an amount corresponding to from 0.9 to 1.30 % by weight.

[0013] Moreover, the alloy according to the present invention is characterized in that it further comprises phosphorus and sulphur in a rate of 0.020 % by weight of phosphorus and in a rate less than or equal to 0.010 % by weight for sulphur.

[0014] Experimental tests have shown that the mixture obtained by the combination of the above mentioned substances, in the amounts included in the indicated ranges, provides unexpected toughness, wear resistance, sharp corner compression resistance and machining properties, which are much greater than those of prior steels.

[0015] Thus, a main aspect of the present invention is that it allows to easily make cold-working tools having a higher efficiency and greater duration than those of like tools made starting from conventional steels.

[0016] The invention is susceptible to several variations and modifications, coming within the scope of the inventive idea.

Claims

1. An alloys for making a special steel for cold-working tools, **characterized in that** said alloy comprises, alloyed with the iron, from 0.90 to 1.30 % by weight of carbon; from 7.0 to 8.5 % by weight of chromium; from 1.35 to 1.70 % by weight of molybdenum; from 2.0 to 2.60 % by weight of vanadium; and from 0.80 to 1.40 % by weight of tungsten.
2. An alloy for making a special steel for cold-working tools, according to Claim 1, **characterized in that** said alloy further comprises from 0.3 to 0.5 % by weight of manganese.
3. An alloy for making a special steel for cold-working tools, according to Claim 1 or 2, **characterized in that** said alloy further comprises from 0.9 to 1.30 % by weight of silicon.
4. An alloy for making a special steel for cold-working tools, according to one or more of the preceding claims, **characterized in that** said alloy further comprises phosphorus in a weight rate less than or equal to 0.020 and sulphur, in a weight rate less than or equal to 0.010.
5. An alloy for making a special steel for cold-working tools, according to one or more of the preceding claims, **characterized in that** said alloy comprises one or more of the disclosed and/or illustrated features.



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EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GB 2 260 991 A (VENANZETTI SRL) 5 May 1993 (1993-05-05) * the whole document *	1-5	C22C38/22 C22C38/24
X	EP 0 875 588 A (CRUCIBLE MATERIALS CORP) 4 November 1998 (1998-11-04) * claim 1; example PM110CRVM0; table 1 *	1-5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			C22C
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 10 September 2001	Examiner Lilimpakis, E
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	

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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10-09-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2260991 A	05-05-1993	IT 1244297 B	08-07-1994
		DE 4115842 A	16-01-1992
		FR 2664293 A	10-01-1992

EP 0875588 A	04-11-1998	US 5830287 A	03-11-1998
		BR 9803298 A	28-09-1999
		CA 2231133 A	09-10-1998
		CZ 9800958 A	15-09-1999
		HU 9800590 A	28-12-1998
		JP 11006041 A	12-01-1999
		PL 325752 A	12-10-1998
		SK 45698 A	02-12-1998
US 5989490 A	23-11-1999		
