Internal distribution code:

(A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 30 June 2015

Case Number:	T 1081/14 - 3.2.08
Application Number:	07861108.4
Publication Number:	2092088
IPC:	C21D9/00, C21D5/00, C22C37/04, E02F3/36
Language of the proceedings:	EN

Title of invention:
METHOD FOR MANUFACTURING AT LEAST PART OF A DEVICE FOR AN EARTHMOVING OR MATERIALS-HANDLING MACHINE USING AUSTEMPERED DUCTILE IRON

Applicant:
Indexator Group AB

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern
Boards of Appeal
Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 1081/14 - 3.2.08

D E C I S I O N
of Technical Board of Appeal 3.2.08
of 30 June 2015

Appellant: (Applicant)	Indexator Group AB P.O. Box 520 922 21 Vindeln (SE)
Representative:	Valea AB Box 1098 405 23 Göteborg (SE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 12 December 2013 refusing European patent application No. 07861108.4 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	T. Kriner
Members:	M. Alvazzi Delfrate
	D. T. Keeling

Summary of Facts and Submissions

I. By its decision posted on 12 December 2013 the examining division refused European patent application No. 07861108.4.

The examining division was of the view that each of the requests then on file contravened the requirements of Articles 84 and 123(2) EPC and related to subject-matter which did not involve an inventive step starting from each of

D2: "Austempered ductile-iron castings - advantages, production, properties and specifications", MATERIALS AND DESIGN, LONDON, GB, ISSN: 0261-3069, vol. 13, no. 5, 1 January 1992 , pages 285-97; and

D4: HUNG F-Y et al: "The microstructural effects on tensile properties and erosion wear resistance in upper bainitic ADI related to variation in silicon content" Mat. Trans., vol. 43, no. 7, (2002-07-01), pages 1748-57.

II. The appellant (applicant) lodged an appeal against that decision in the prescribed form and within the prescribed time limit.

III. The appellant requests that the decision under appeal be set aside and that a patent be granted on the basis of the request filed with letter dated 25 June 2015.

IV. Claim 1 reads as follows:

"Method for manufacturing at least one part of a mechanically or hydraulically operated tiltrotator (22) or rotator (26) for an arm (12) of an earth-moving or

material-handling machine, such as an excavator, tractor, harvester, forwarder or crane (10), whereby the tiltrotator (22) or rotator (26) is arranged to hold a tool (14), such as a bucket, grapple, fork, vibratory compactor or harvesting head, and providing said at least one part of said tiltrotator (22) or rotator (26) with a wear resistant surface, whereby said method comprises the steps of:
a) forming a melt comprising unalloyed or alloyed ductile iron,
b) casting at least one part of a tiltrotator (22) or rotator (26) from said melt,
c) allowing said at least one part of the tiltrotator (22) or rotator (26) to cool,
d) austenitizing said at least one part of the tiltrotator (22) or rotator (26),
e) quenching said at least one part of the tiltrotator (22) or rotator (26),
f) austempering said at least one part of the tiltrotator (22) or rotator (26), and
g) allowing said at least one part of the tiltrotator (22) or rotator (26) to cool,
• shaping at least one surface (29) on said at least one part of the tiltrotator (22) or rotator (26) during the casting process or during subsequent machining before ADI treatment, and
• mounting said tiltrotator (22) or rotator (26) on said arm (12) of an earth moving or material-handling machine,
characterized in that the step of providing said at least one part of the tiltrotator (22) or rotator (26) with said wear resistant surface is carried out after said step of mounting said tiltrotator (22) or rotator (26) on said arm (12) of an earth moving or material-handling machine, whereby the surface material (29) of said at least one part undergoes a transformation to

martensite when said at least one part of the tiltrotator (22) or rotator (26) is subjected to a high contact force during use, thus forming and subsequently regenerating said wear resistant surface, whereby no extra process step to provide said at least one part of the tiltrotator (22) or rotator (26) with a wear-resistant surface is therefore necessary after said at least one part of a tiltrotator (22) or rotator (26) has been cast and austempered and before said device (22) is mounted on said arm (12) of an earth moving or material-handling machine."

V. The appellant's arguments can be summarised as follows:

Claim 1 now clearly defined the scope of the protection sought and was based on the application as originally filed. Moreover, its subject-matter was novel over the prior art and involved an inventive step.

Reasons for the Decision

1. Article 123(2) EPC

The objection under Article 123(2) EPC raised in the decision under appeal related to the introduction into the claims of the wording "to make tribological contact". However, this expression does not appear anymore in the claims. Hence, this objection is now overcome.

Nor does the Board see any reason to question the compliance with the requirements of Article 123(2) EPC

for other reasons, since claim 1 is based on claims 1, 3 and 5 as filed and the description on page 5 and the dependent claims are based on the originally filed claims 2, 6-12.

2. Clarity

Present claim 1 has been amended to direct it to a method for manufacturing at least one part of a tiltrotator or rotator and providing said at least one part of said tiltrotator or rotator with a wear-resistant surface. The wear-resistant surface is formed after the step of mounting said tiltrotator or rotator on an arm of an earth moving or material-handling machine, when the surface material undergoes a transformation to martensite as the at least one part of the tiltrotator or rotator is subjected to a high contact force during use. Hence, the method which is presently claimed clearly comprises the steps of mounting the tiltrotator or rotator on the arm and afterwards subjecting it to high contact force to cause the martensitic transformation. Accordingly, there is no ambiguity as to which are the steps comprised in the claimed method. Therefore, claim 1 complies with the requirements of Article 84 EPC.

3. Inventive step

3.1 The inventive step has been questioned starting from each of D2 and D4.

The closest prior art for assessing inventive step is normally a prior art document disclosing subject-matter conceived for the same purpose or aiming at the same objective as the claimed invention and having the most relevant technical features in common.

3.1.1 D2 discloses forming a melt comprising ductile iron, casting a part from said melt, allowing the part to cool, austenitizing by heating and holding it at an austenitizing temperature of between 800-1000°C for a time until it becomes fully austenitic and the matrix becomes saturated with carbon. After it is fully austenitized, the part is quenched to an austempering temperature of between 250-400°C at a high quenching rate in a quenching medium, held at the austempering temperature and allowed to cool to room temperature (see Figure 1). At higher austempering temperatures a structure is obtained which transforms to martensite when subject to wear processes that cause surface straining (page, 293, left-hand column).

However, D2 does not disclose a tiltrotator or rotator for an arm of an earth moving or material-handling machine, but merely states that grey cast irons are used in a wide range of engineering components, such as engine blocks, cylinder heads, brake drums, gearbox casings, ingot moulds and lathe beds, as well as finding use in architectural work, for ornamental purposes and for cooking ware (page 285, left-hand column, first paragraph).

3.1.2 D4 relates to the problem of particle erosion when ADI (austempered ductile iron) is used to perform functions in equipment including farming tools, blast machines, and automatic molding equipment (page 1748, Introduction, fist paragraph). It discloses an austempering treatment (page 1751) but does not mention a martensitic transformation.

3.1.3 Hence, neither D2 nor D4 relate to the manufacture of a tiltrotator or rotator for an arm of an earth moving or

material-handling machine. Therefore, neither of them is a realistic starting point for developing the invention which is now claimed. Rather, the choice of one of these documents as starting point could only have been the result of hindsight.

3.2 Additionally, neither of them discloses the step of forming a wear-resistant surface after the step of mounting a device on an arm of an earth-moving or material-handling machine, when the surface material undergoes a transformation to martensite as a part of the device is subjected to a high contact force during use.

D2 rather discloses a method of improving fatigue resistance by performing cold working such as controlled shot peening or fillet rolling to transform retained austenite to martensite (page 290, Finishing processes). As to D4, it does not mention at all a transformation to martensite.

Therefore, even if D2 and D4 had been taken into consideration they would not have hinted at the claimed process.

3.3 As a consequence, the claimed method involves an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division with the order to grant a patent on the basis of

claims 1 to 9 submitted with letter of 25 June 2015;

description pages 1 to 15 submitted with letter of 25 June 2015; and

drawing sheets 1 to 6 as published.

The Registrar: The Chairman:

V. Commare T. Kriner

Decision electronically authenticated