BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Publication in the Official Journal ~~Yes~~ / No

File Number: T 554/89 - 3.3.3

Application No.: 82 109 481.0

Publication No.: 0 077 079

Title of invention: Non-magnetic alloy having high hardness

Classification: C22C 38/58

D E C I S I O N
of 12 August 1991

Proprietor of the patent: KUBOTA LTD.

Opponent: Thyssen Edelstahlwerke AG, Düsseldorf

Headword:

EPC Art. 56

Keyword: "Inventive step - confirmed"

Headnote

Case Number : T 554/89 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 12 August 1991

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Decision under appeal :
Interlocutory decision of the Opposition Division of the European Patent Office dated 22.06.89 concerning maintenance of European Patent No. 0 077 079 in amended form.

Composition of the Board :

Chairman : F. Antony
Members : R.A. Lunzer
W. Moser

Summary of Facts and Submissions

I. European patent No. 77 097 was granted on 11 September 1985 on the basis of application No. 82109481.0 filed on 13 October 1982.

II. On 13 February 1986, and on 10 June 1986, oppositions were lodged respectively by the Appellant, and the second opponent, on the ground of Article 100(a) EPC, alleging lack of novelty (Article 54 EPC), and lack of any inventive step (Article 56 EPC). The Opponents relied on the following documents as relevant prior art:

(1) Materiaux et Techniques, Dec. 1977, pages 69 to 87.
(2) Metal Progress, Nov. 1949, pages 680 and 680-B
(3) STAHL-EISEN-WERKSTOFFBLATT 390-61, April 1961
(4) US-A-3 711 276
(5) US-A-3 151 979.

III. By its statement dated 20 April 1988 the Respondent (patentee) filed amended documents restricting the scope of the claims. Amended Claim 1 reads as follows:

"The use of an alloy having a magnetic permeability of up to 1.004 and a hardness of at least 215 in Vickers number, and consisting of the following components in the following proportions in % by weight:

C	0.1 - 0.6
$0 < Si \leq$	2.0
Mn	5 - 15
Cr	5 - 15
Ni	5 - 13
V	1 - 3 and
one of	Mo 0.4 - 1
	Nb 1.5 - 2

the balance being Fe and inevitable impurities, for electro-magnetic stirrer rolls for continuous casting equipment."

The only other claim, Claim 2, is formally independent, but differs from Claim 1 solely to the extent that both molybdenum and niobium must be present in the ranges specified in Claim 1.

IV. By its Interlocutory Decision dated 22 June 1989, the Opposition Division held that no valid grounds of opposition existed to the maintenance of the patent as amended. It identified document (5) as being the closest prior art, and observed that it disclosed steels having compositions which overlapped the steels, the use of which is now claimed, although the exemplified steels had compositions differing from those of the steels used according to the claims in suit, and concluded that it contained no teaching which would lead a skilled worker to the claimed use. Further it held that the other cited documents would not lead to any modification of the teaching of document (5) in the direction of the alleged invention.

V. An appeal against that decision was lodged on 21 August 1989, the appeal fee was paid on the same day, and the Grounds of Appeal were filed on 25 October 1989. The Grounds of Appeal were very brief, referred to the case presented to the Opposition Division, and contended that, given the fact that document (1) disclosed compositions which were austenitic and fell within the compositions claimed in Claim 1 in suit, the skilled reader seeking a steel which had both high magnetic permeability and considerable hardness would recognize that the steels there disclosed were pre-eminently suited for the purpose of making electro-magnetic stirrer rolls.

VI. The Respondent did not file any response to the Grounds of appeal, and neither party asked for oral proceedings.

VII. The Appellant requested that the patent should be revoked. In the absence of any response from the Respondent, it is deemed to have requested that the patent be upheld in the form which the Opposition Division found could be maintained.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rules 1(1) and 64 EPC, and is admissible.

2. Claim 1 now in issue combines the use feature of Claim 2 as granted, with the composition features of granted Claim 1. Furthermore Claim 1 is limited by the introduction of minimum levels for both molybdenum and niobium, one or the other being essential in accordance with the Claim. The combination of the two claims is admissible, since it restricts the scope of Claim 1 as granted. The lower limit for molybdenum is to be found in Example 3 in the application as originally filed, and the lower limit for niobium in original Examples 11 and 12. Accordingly, the Board is satisfied that the proposed amendments are permissible having regard to the requirements of Articles 123(2) and 123(3) EPC.

3. None of the cited prior art documents discloses the use of an alloy as now defined in Claim 1 for the purpose specified. The subject matter of Claim 1 is therefore novel for the purposes of Article 54 EPC. Novelty being uncontested at the appeal stage, more detailed reasons are unnecessary.

4. The decision under appeal starts from (5) as being the closest prior art. However, that document is directed to using steels of comparable composition for a purpose which is markedly different from the use here in issue. The only document before the Board which describes a non-magnetic steel for use in electro-magnetic stirrer rolls is the reference to be found in the specification of the patent in suit on page 2, lines 13 to 16. In the view of the Board, the closest prior art in the present case is the disclosure there that the standard alloy AISI 304 has been used hitherto for electro-magnetic stirrer rolls of the kind here in issue. The composition of that alloy is given in connection with specimen No. 113 in Table 1 page 4, line 32, together with an indication of its magnetic permeability and its Vickers hardness number. With respect to both of these properties, it falls outside the levels required by Claim 1, its magnetic permeability being above the claimed upper limit of 1.004, at 1.006, and its hardness significantly below the claimed lower limit of above 215, at 165.

5. Seen against the background of this prior art, the problem with which the alleged invention is concerned is to find an alloy suitable for making electro-magnetic stirrer rolls, which would have improved magnetic permeability and hardness. To that end it proposes the use of alloys having the composition identified in Claim 1. The figures given in Table 1 on page 3 of the specification in suit with respect to alloys in accordance with the claimed use, in comparison with the figures given at page 4, line 32 relating to the alloy AISI 304 (specimen No. 113) show credibly that, provided the composition limits of the alleged invention are adhered to, the above problem is actually solved.

6. The issue of inventiveness turns on whether a skilled person, confronted with the problem of improving the magnetic permeability and hardness of stirrer rolls made of alloy AISI 304, would find any pointer in the entire prior art before the Board towards the claimed use of an alloy within the compositional ranges of the alleged invention.

7. A skilled worker seeking to improve the magnetic permeability and hardness of stirrer rolls hitherto made of an 18:8, Cr:Ni alloy, might consider the use of other steels known for their non-magnetic properties, such as the Mn, Cr, Ni austenitic steels. A series of such steels is disclosed in document (5), which relates to steels said to have high magnetic permeability, and high yield strength, for use in retaining rings for generators. However, although good magnetic permeability is an objective, the desired level of permeability is stated at the very modest level of less than about 1.2, at col. 1 line 25, and no figures are given at all in respect of the alloys actually made and tested. Therefore, in the light of the existing problem, which, inter alia, is to reduce further a permeability of 1.006, the skilled person would not follow the teaching of (5). Moreover, the compositions disclosed in document (5) are similar, but not identical, to those used in the patent in suit. They differ in that molybdenum, when included, is present to the extent of 2.07 and 2.08%, i.e. it is above the claimed range, and vanadium when present is below the claimed range. The yield strengths when subjected to suitable heat treatments are above a minimum level of 170,000 psi. The skilled reader of such a document will know that there is generally a close correlation between strength and hardness. However, this document contains no pointer at all towards using less molybdenum, and more vanadium, in the expectation of obtaining significantly improved magnetic permeability.

Consequently the Board is of the view that this document would not lead the skilled worker to modify the composition of steel AISI 304 in the direction of the alleged invention.

8. Document (1) at page 76 Table 6 discloses a Russian alloy identified as 40 KH 15 N7 G7 F2MS, which has a composition falling within the limits expressed in the present Claim 1. Although this research report comments favourably on the strength of these alloys, and the skilled reader would appreciate that, when in the austenitic condition, they would be substantially non-magnetic, there is no pointer in this document towards the attainment of any particularly significant level of magnetic permeability, and no discussion of the potential uses of these alloys. Accordingly, the Board does not regard document (1) as being any more pertinent than document (5).

9. Document (2) is an example of the well-known Schaeffler diagram which can be used for predicting the micro-structure of steel alloys, but the level of prediction possible with respect to physical properties is limited, and it would be of little help to a worker seeking specific levels of magnetic permeability and hardness.

10. Document (4) refers to a non-magnetic steel alloy intended for use in gun barrels. The compositions disclosed overlap those of the present invention, but the preferred compositions disclosed contain 1.2 to 2.5% of tungsten, which is not included in the claimed compositions. The Board does not see in this document any pointer towards the specific use of the invention. Likewise, the alloys disclosed in document (3) are no more pertinent, as they do not contain any molybdenum or niobium, and they show at best a magnetic permeability of 1.02.

11. As none of the above documents, whether taken alone or in combination with any others, contains any clear pointer towards the invention, the Board is satisfied that the objection of lack of inventive step has not been established. Independent Claim 2, which differs from Claim 1 only in that both molybdenum and niobium have to be present, is consequently valid too.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Goergmaier F. Antony