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Bezeichnung der Erfindung: Semi-finished steel article and method for
Title of invention: producing same
Titre de l'invention :

Klassifikation / Classification / Classement : C22 C38/60

ENTSCHEIDUNG / DECISION
vom / of / du 27 August 1987

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /
Titulaire du brevet : INLAND STEEL COMPANY

Einsprechender / Opponent / Opposant : Thyssen Stahl AG

Stichwort / Headword / Référence :

EPO / EPC / CBE Articles 54, 56

Kennwort / Keyword / Mot clé : "Novelty (denied)" - "Selection from a numerical range" - "A feature which is not clearly defined cannot be relied upon as distinguishing over the prior art".

Leitsatz / Headnote / Sommaire

Europäisches
Patentamt

Beschwerdekammern

European Patent
Office

Boards of Appeal

Office européen
des brevets

Chambres de recours



Case Number : T 75/87

DECISION
of the Technical Board of Appeal 3.3.1
of 27 August 1987

Appellant :
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Decision under appeal : Decision of the Opposition Division of the European
Patent Office dated 8 October 1986* revoking
European patent No. 0 045 815 pursuant to
Article 102(1) EPC.

* posted on 15 December 1986

Composition of the Board :

Chairman : K. Jahn

Members : J. Arbouw
G. D. Paterson

Summary of Facts and Submissions

- I. European patent No. 45 815, incorporating eleven claims, was granted on 11 July 1984 to the Appellants on the basis of European patent application No. 80 104 708.5, filed on 11 August 1980.

Claim 1 of the patent as granted reads:

- "1. A method for producing a free machining, elongated, semi-finished, tellurium containing steel shape devoid of surface cracking, prior to any surface conditioning thereof, due to lead telluride, characterised in that said method comprises the steps of:

providing a bath of molten steel having a composition comprising, in wt. %:

carbon	> 0 to 1.0
manganese	0.30-1.6
sulphur	> 0 to 0.35
bismuth	(a) 0.25-0.40 when no lead is present (b) 0.10-0.40 when lead is present
tellurium	machinability increasing amounts (a) > 0 to 0.06 when no lead is present (b) > 0 to 0.02 when lead is present
silicon	> 0 to 0.30
phosphorous	> 0 to 0.12
lead	0-0.15
iron and usual incidentals	essentially the balance;

casting said molten steel into an elongated solid shape;

said steel being provided with sufficient manganese and bismuth so that, in said solid shape, all of the tellurium is combined with said manganese and/or said bismuth as micro-inclusions of $MnTe$ and/or Bi_2Te_3 (except that when lead is present some of the tellurium may be combined with lead as micro-inclusions of $PbTe$ in amounts insufficient to produce substantial surface cracking during hot forming of said billet) and said bismuth is also present as micro-inclusions of elemental bismuth, there being substantially no $FeTe$ present in said solid shape,

heating said elongated steel shape to a hot deforming temperature, without burning the steel shape;

and hot deforming said elongated shape while the latter is at a temperature above about $920^{\circ}C$ ($1700^{\circ}F$) and below $1150^{\circ}C$ ($2100^{\circ}F$)."

II. On 4 April 1985 the Opponents filed a notice of opposition requesting the revocation of the patent in its entirety because it does not meet the requirements of the Articles 52 to 57 and 83 EPC. The opposition was supported by the following prior art document

(1) DE-A-2 937 908.

III. By its decision of 8 October 1986 posted on 15 December 1986 the Opposition Division revoked the patent.

The decision to revoke the patent was based on the argument that its subject-matter is not novel with respect to (1).

It was concluded that (1) discloses elongated free machining steel shapes which are subjected to rolling at a final rolling temperature of 950°C or more and which, according to the Examples 7, 15 and 19, have a composition falling within the area as claimed in the patent-in-suit.

It was further considered that the expression "usual incidentals" in the claim of the patent-in-suit includes the small amounts of Cr and Ni present in the shapes according to (1), and that the expressions "machinability increasing amount" of Te being "generally about 0.02 wt. %" is not sufficiently clear as a delimitation from the prior art.

- IV. A Notice of Appeal was filed by the Appellant against this decision on 12 February 1987 and the appeal fee was also paid in due time. A Statement of Grounds was filed on 3 April 1987, together with an alternative set of claims, of which Claim 1 differs from Claim 1 as granted in that the hot deforming step is carried out above 920°C and below 1035°C.

The Appellant submits that Reference (1) does not recognise the problem of surface cracking due to PbTe or how to deal with this problem. The patent-in-suit solves the problem of surface cracking by indicating that Tellurium should be present in "machinability increasing amounts" and that the rolling operation should be carried out at a temperature between > 920 and < 1150 °C for the method according to the main request and between > 920 and < 1035 °C for the method according to the auxiliary request.

- V. The Respondent filed a response to the Appellant's Statement in which he contests that (1) does not deal with

the problem of surface cracking. Table IV in Reference (1) shows that the steel shapes Nos. 7, 15 and 19 are free of cracking.

It was further submitted that the Te content and the rolling temperature of 950°C according to (1) fall within the range claimed within the patent-in-suit. Therefore, the subject-matter of the patent-in-suit is not novel over (1).

- VI. In the oral proceedings on 27 August 1987, the Board expressed its doubts as regards the novelty of the subject-matter of the claims on file. It was further indicated that amendment of the claims by introducing the amount of Te as defined on page 4, line 24 of the description would appear not sufficient to create novelty since the expression "generally about" is not clear and does also cover the composition of at least Example 7 of document (1). However, a limitation of the Te content to 0.02-0.06% when no lead is present and to 0.02% when lead is present might create novelty.
- VII. During oral proceedings the Appellant filed two further alternative sets of claims. The first of these differs from the claims filed with the statement of grounds (see paragraph IV above) by indicating that the hot deforming is commenced at a temperature below 1035°C. The second set differs from the claims as granted in that the tellurium content is limited to 0.02-0.06 wt. % when no lead is present and to 0.02 wt. % when lead is present.

The Appellant reaffirmed its points as regards novelty for all four sets of claims and further submitted that an inventive step is given over (1), since this document is not concerned with surface checking due to tellurium but

with the entirely different problem of avoiding anisotropy due to sulphur.

- VIII. The Respondent reaffirmed its points as regards novelty for the first three sets of claims but admitted that the fourth set of claims is novel over the prior art represented by (1).

For these claims, however, he submitted that an inventive step is not present because (1) (see page 10, first paragraph) discloses that tellurium in an amount up to 0.1%, preferably from 0.003-0.3%, improves the workability of steel. The range of 0.02-0.06 wt. % of tellurium for this purpose is obvious for the man skilled in the art, because he knows that tellurium is an expensive element and he will, therefore, try to minimise the amount used.

- IX. The Appellant requested that the decision under appeal be set aside and that the patent be maintained in unamended form, as a main request, or that the patent be maintained in amended form in accordance with the first, second or third auxiliary requests submitted during oral proceedings (which correspond to the claims mentioned in paragraphs I, IV and VII above).

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is therefore admissible.

2. There is no formal objection to the current versions of the claims, since these are adequately supported by the original documents and do not extend the protection conferred by the patent as granted. The new upper limit for the hot deforming temperature ($<1035^{\circ}\text{C}$) in Claim 1 according to the first and secondary auxiliary request, is based on Claim 5 and page 6, last paragraph as filed and on Claim 5 and page 4, lines 1-6 of the patent as granted.

The limitation of the range for the tellurium content (0.02-0.06% when no lead is present, 0.02% when lead is present) in Claim 1 according to the third auxiliary request, is based on Claim 1 and page 7, fourth paragraph as filed and on Claim 1 and page 4, lines 24-25, of the patent as granted.

3. The closest prior art is represented by (1). This document is concerned with a method for producing a free-machining, semi-finished, tellurium containing steel shape which is hot deformed at a temperature of 950°C or above (see page 28, lines 16-18). Document (1) further discloses in Example 1, Experiments 7, 15 and 19, semi-finished steel shapes having the following compositions:

No.	C.	Si	Mn	Cr	Ni	S	Te	P	Pb	Bi
7.	0,55	0,26	0,85	0,11	0,11	0,055	0,014	0,014	0,05	0,26
15	0,34	0,30	0,76	1,03	0,10	0,074	0,008	0,017	-	0,28
19	0,37	0,28	0,73	0,72	1,28	0,041	0,011	0,014	0,15	0,12

- 3.1 Bearing in mind that small amounts of Cr and Ni are "usual incidentals" in steel (particularly when remelted from scrap) it is observed that the above listed alloys according to (1) have compositions falling exactly in the ranges of the alloying elements of the alloy compositions

of present Claim 1 according to the main and first and second auxiliary request.

- 3.1.1 During oral proceedings, the Appellant admitted that hot deforming of steel shapes generally is carried out in the temperature range of 920°-1150°C. Therefore, the range for the hot deforming temperature as claimed according to the main request - i.e. 920-1150°C - is usual in the art and does not render the subject-matter of that claim novel.
- 3.1.2 It was further admitted that the temperature at which hot deforming is commenced (i.e. the upper limit) depends on the size of the shape and the amount of reduction required. Therefore, a starting temperature of 1035°C for the hot deforming step is also quite usual in the art.

The Appellant's argument that the temperature range of 920-1035°C is a selection from the most common range 920-1150°C is not accepted. In its decisions Füllstoff/Plüss-Stauffer (T 17/85, O.J. 1986, page 406) and Thiochloroformates, Hoechst (T 198/84, O.J. 1985, page 209) the Board laid down the conditions under which a selection from a numerical range can be allowed. These decisions provided that for a sub-range selected from a broader range of numbers to be patentable the selected sub-range must be narrow and sufficiently far removed from the known range illustrated by means of examples.

At least the first condition is not met in the present case. The selection of half of the usual range (920-1035°C instead of 920-1150°C) is not narrow.

Therefore, the indication of an upper limit of 1035°C for the hot-deforming temperature does not render the claims, according to the first and second auxiliary request, novel.

3.1.3 The Appellant submitted that the subject-matter of the claims according to the main request and the first and second auxiliary request is different from the subject-matter according to (1) because it is indicated that tellurium shall be present in "machinability increasing amounts of > 0 to 0.06% and > 0 to 0.02% respectively". According to the description (see page 4, lines 24-25) "a machinability increasing amount of tellurium is generally about 0.02 wt. % minimum" (emphasis added).

The Board, however, holds the view that such a vague formulation may be interpreted broadly so as to include the compositions of Example 1, Experiments 7, 15 and 19 of document (1). It is incumbent upon the Patentee to define clearly the scope of protection sought. Such an unclear definition of the tellurium content - i.e. "machinability increasing amounts" and "generally about 0.02 wt. % minimum" does not distinguish the subject-matter of the patent-in-suit from the prior art represented by (1). A feature of a claim which is not clearly defined cannot fairly be relied upon by the Patentee as a distinguishing feature over the prior art.

3.2 For the reasons given above, the subject-matter of the claims according to the main request and to the first and second auxiliary requests is not novel over the prior art.

Consequently, these requests must fail.

3.3 In contrast, examination of the cited documents has revealed that a steel having the composition as described in Claim 1 according to the third auxiliary request is not disclosed there; since the known compositions mentioned in paragraph 3 above have tellurium contents (0.014, 0.008 and 0.011%) outside the range (0.02 - 0.06% when no lead

is present and 0.02% when lead is present) as limited according to this auxiliary request.

Given that there is a total of 88 examples of possible compositions in (1), a skilled person would not have understood the ranges of compositions now claimed in the patent in suit as implicitly disclosed, even though three specified experiments (Experiments 35, 38 and 43) mention Te contents of 0.021, 0.020 and 0.028. Moreover, the bismut content in these compositions lies outside the range referred to in Claim 1 of the patent-in-suit as proposed in the third auxiliary request.

It is also not allowable to deny novelty of the now claimed compositions by combination of Experiments 7, 15 and 19 with the range for the Te content as claimed in Claim 1 of (1) ($\leq 0.10\%$ respectively $0.003 - 0.030\%$), since bismut - an element which according to the patent-in-suit is essential - is not mentioned there. In Claims 4 and 5 of (1) bismuth is only mentioned as one out of several possible alloying elements which - optionally together with further elements - can be added. Consequently, this steel composition is novel over the cited prior art.

Therefore, a process according to the third auxiliary request for producing free-machining steel shapes having this composition is also novel over the cited art.

4. The process according to (1) differs from the method according to Claim 1 (third auxiliary request) in that a different steel composition is used, particularly as regards the tellurium and bismuth content, as mentioned in paragraph 3.3 above. This difference is significant because it causes a reduction of the surface cracking.

Therefore, with document (1) as the starting point, the technical problem underlying the invention is to provide a method for producing a free-machining tellurium steel shape devoid of surface cracking.

In order to solve this technical problem, the Appellants propose the method of Claim 1 according to the third auxiliary request (see paragraph VII above).

The Board is satisfied that this method actually solves the problem as defined above (see the patent page 4, lines 42-45). Since this point was not disputed by the Respondents it is not necessary to enter into further detail.

5. The question which remains is whether the requirement for inventive step is met by the subject-matter claimed according to the third auxiliary request.

5.1 Document (1) deals with the technical problem of making available a free-machining steel with less anisotropy in mechanical properties (see page 7, first and third paragraph). It proposes as a solution to that technical problem to add up to 0.1% of tellurium so that a ratio of Te:S of at least 0.01 is achieved (see Claim 1; page 8, first paragraph and page 10, second paragraph).

Document (1) does not mention the problem of surface cracking. The Respondents have submitted that the steels according to (1) are also devoid of surface cracking. They cited as support page 34, line 10 and Table VI where it is indicated that the steel according to (1) is devoid of cracks. However, it is clear from the paragraph as a whole that this steel is devoid of inner cracks and that for test reasons the steel is scoured off so that inner cracks become surface cracks (see particularly page 34, lines 8-13).

Document (1) further indicates that optionally bismuth may be added up to 0.4% (see Claim 4 and page 13, first paragraph). It is stated that this element increases machinability. Document (1) does not indicate that bismuth - in a particular amount and in combination with tellurium - also decrease surface cracking.

Document (1) contains no teaching or suggestion to the man skilled in the art that the addition of bismuth and tellurium in the amounts as defined in Claim 1 according to the third auxiliary request will solve the existing technical problem.

- 5.2 The Respondent's submission that tellurium is an expensive element, and that therefore the man skilled in the art will use as little as possible, and therefore will automatically come to the amount of tellurium as defined in Claim 1 of the patent-in-suit, is not persuasive. This argument does not take into account that for solving the technical problem a particular tellurium content in combination with a particular amount of bismuth is essential.
- 5.3 For the reasons given above, in view of the problem underlying the claimed method, the Board considers that the prior art cited and the common general knowledge did not provide any indication that a particular amount of tellurium in combination with a particular amount of bismuth would provide a free-machining steel devoid of surface cracking. Thus, in the judgement of the Board the method according to Claim 1 involves an inventive step.
- 5.4 Claims 2-7 concern particular embodiments of the method according to Claim 1 and thus are supported by the patentability of that claim, and are allowable.

- 5.5 The subject-matter of Claims 8-11, directed to the as-deformed billets obtained by the method according to Claims 1-7, which represent patent claims of different category, is also novel and inventive over document (1) for the reasons given under 3.3 and 5.1-5.3 above.

Order

For these reasons, it is decided that:

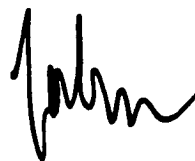
1. The decision under appeal is set aside.
2. The main request, the first and the second auxiliary requests submitted during oral proceedings are refused.
3. The case is remitted to the first instance with the order to maintain the patent in amended form in accordance with the third auxiliary request (amended description and 11 claims submitted during oral proceedings).

The Registrar



F.Klein

The Chairman



K.Jahn