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Datasheet for the decision of 18 December 2007

Case Number: T 0281/05 - 3.4.03

Application Number: 97114084.3

Publication Number: 0826795

IPC: C25D 5/48

Language of the proceedings: EN

Title of invention:
Stainless steel wire and producing method thereof

Patentee:
Sumitomo Electric Industries, Ltd.

Opponent:
UGITECH

Headword:
-

Relevant legal provisions:
EPC Art. 100(a), (b), 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Sufficiency of disclosure (yes)"
"Inventive step (no)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0281/05 - 3.4.03

D E C I S I O N
of the Technical Board of Appeal 3.4.03
of 18 December 2007

Appellant: (Opponent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 23 December 2004 rejecting the opposition filed against European patent No. 0826795 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: R. G. O'Connell
Members: R. Q. Bekkering
U. Tronser

Summary of Facts and Submissions

I. This is an appeal against the rejection of the opposition against EP 0 826 795.

II. The appellant opponent requested that the decision under appeal be set aside and that the patent be revoked.

The respondent proprietor requested as a main request dismissal of the appeal and as an auxiliary request maintenance of the patent in amended form based on claims 1 to 3 filed in the oral proceedings.

III. Claim 1 as granted reads as follows:

"*1. A method for producing a spring of a stainless steel wire, comprising the steps of:*
plating nickel having a thickness in the range of 1 μm to 5 μm on a stainless steel core wire comprising carbon (C) in an amount of not more than 0.15% by weight, silicon (Si) in an amount of not more than 1.00% by weight, manganese (Mn) in an amount of not more than 2.00%, nickel (Ni) in an amount of from not less than 6.50% by weight to less than 14.00% by weight and chromium (Cr) in an amount of from not less than 17.00% by weight to less than 20.00% by weight;
generating an inorganic salt coat film comprising at least one of potassium sulfate and borax (borate) and free from chlorine (Cl) and fluorine (F) from an aqueous solution to be deposited on said nickel plate layer;
drawing said wire to a reduction of area of not less than 60%; and

coiling said drawn stainless wire."

Independent claim 3 as granted reads as follows:

"*3. A spring comprising:*
a stainless steel core wire comprising carbon (C) in an amount of not more than 0.15% by weight, silicon (Si) in an amount of not more than 1.00% by weight, manganese (Mn) in an amount of not more than 2.00%, nickel (Ni) in an amount of from not less than 6.50% by weight to less than 14.00% by weight and chromium (Cr) in an amount of from not less than 17.00% by weight to less than 20.00% by weight;
a nickel (Ni) plate layer having a thickness of from not less than 0.3 μm to not more than 1.7 μm on said stainless steel core wire; and
an inorganic salt coat film comprising at least one of potassium sulfate and borax (borate) and free from chlorine (Cl) and fluorine (F) deposited on said nickel layer;
wherein a tensile strength of said stainless steel wire is not less than 160 kgf/mm^2 and a surface roughness thereof is in the range of 0.80 to 12.5 μmRz."
The remaining claims 2, 4 and 5 as granted are dependent claims.

IV. In the auxiliary request, claims 1 and 2 as granted are deleted and remaining claims 3 to 5 are renumbered.

Claim 1 of the auxiliary request, thus, corresponds to claim 3 of the main request.

V. The following documents were cited:

D1: S. Takamura, "Fundamental analysis of coiling formability of stainless steel wire", Sumitomo Electric Industries Ltd., 1992, pages 197 to 204

D2: EP-A-0 608 466

D3: US-A-3 966 425

D4: DD-A-1 159 778

D5: US-A-5 012 662

D6: US-A-4 197 340

VI. The appellant opponent submitted in substance the following:

The patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. In particular the patent did not disclose how the surface roughness specified in claim 3 was to be obtained. As shown by example K in the patent, much higher surface roughnesses could result showing that the issue was not trivial.

Moreover, the subject-matter of independent claims 1 and 3 as granted lacked an inventive step. Document D2 provided the closest prior art, as indicated in the opposed patent. The only difference between the subject-matter of either one of claims 1 and 3, and D2 was the use of a specific salt coating rather than a

resin coating. The objective problem to be solved starting from this document was to overcome the drawbacks of the resin coating in terms of corrosion and pollution. This problem was, as a matter of fact, correctly identified in the patent in suit. The problem was addressed in document D6, the solution suggested being the use of an inorganic salt coat film comprising at least one of potassium sulphate and borax and free from chlorine and fluorine, as claimed.

The auxiliary request, submitted by the respondent proprietor for the first time in the oral proceedings before the board, should be rejected as inadmissible in view of its unjustified lateness.

VII. The respondent proprietor argued in substance as follows:

The skilled person would not have any difficulty in obtaining the specified surface roughness. The information provided in the patent, together with the skilled person's common general knowledge of the relevant process steps and parameters for producing the spring, were sufficient to arrive at the specified surface roughness. Furthermore, with the aid of the *per se* known surface roughness measurement procedure specified in the patent, the skilled person would be able to select those springs meeting the surface roughness requirements of the patent.

Regarding inventive step, the objective problem to be solved relative to document D2 was to improve the coiling precision. As shown by a number of examples, the springs according to the patent had less

statistical deviation from the desired free length compared to examples shown in document D2. This was attributable to the use of the inorganic salt coating rather than the resin used in D2. Nothing in the available prior art suggested the claimed solution.

Reasons for the Decision

1. The appeal is admissible.

2. *Main claim request of the respondent proprietor - patent as granted*

2.1 *Disclosure of the invention - Article 100(b) EPC*

Claim 3 of the opposed patent stipulates a surface roughness of the drawn wire in the range of 0.80 to 12.5 μmRz. According to the patent "*the surface roughness (according to JIS B 0601) of the stainless steel wire for automatic coiling which has been finally drawn is defined to be from 0.8 μmRz to 12.5 μmRz as disclosed in Unexamined Japanese Patent Publication (kokai) No. 6-226330* [corresponding to document D2]*. To this end, it is necessary that the surface roughness of the unplated stainless steel wire or the plating conditions (e.g., liquid composition, pH, temperature, current, stirring) be controlled*" (see patent, paragraph [0018]). In substance the same information is provided in prior art document D2 corresponding to the above Japanese document referred to. In the board's judgement this information, supplemented by the common general knowledge in the art, is sufficient to enable the skilled person to produce drawn wires with the

specified surface roughness. It is not apparent which specific process steps or conditions - and the appellant opponent failed to indicate any - would represent any particular difficulty for the skilled person, all process steps involved as such being well-known in the art. Some fine-tuning of the process to obtain the specified surface roughness falls within the normal competence of the skilled person. The fact that, as argued by the appellant opponent, a comparative example (K) disclosed in the patent shows a surface roughness outside the targeted range does not change matters. Even where the fabrication process produces a few erratic samples, the measurement of the surface roughness, specified in the opposed patent, allows a simple elimination of these samples which are out-of-spec.

In the board's judgement, it follows that the appellant opponent's objection as to insufficiency of disclosure is unfounded.

2.2 *Inventive step*

2.2.1 *Closest prior art*

Document D2, corresponding to the document cited in the opposed patent, and indeed in the application as originally filed, as the closest related art, discloses a method of forming a spring of a stainless steel wire comprising plating nickel on a stainless steel core wire, forming a resin coating film on the nickel plating, drawing the wire and coiling it, and a corresponding spring formed thereby (see page 1, first

paragraph). In the judgement of the board, this document represents the closest prior art.

In particular, document D2 discloses a stainless core wire (AISI 304 Stainless Steel) comprising carbon (C) in an amount of not more than 0.15% by weight, silicon (Si) in an amount of not more than 1.00% by weight, manganese (Mn) in an amount of not more than 2.00%, nickel (Ni) in an amount of from not less than 6.50% by weight to less than 14.00% by weight and chromium (Cr) in an amount of from not less than 17.00% by weight to less than 20.00% by weight, as per claim 1 of the patent in suit (see document D2, page 3, Table 1).

The wire core is plated with nickel, the nickel plate layer before drawing having a thickness of 1 to 5 μm (see document D2, page 2, line 57), corresponding to the thickness specified in claim 1.

According to document D2, a layer of synthetic resin containing a halogen is coated on the nickel plating (see document D2, page 3, lines 1 to 4).

The wire is then drawn to a reduction area of at least 60% (see document D2, page 3, lines 6 to 8) and subsequently coiled to form a spring, as also stipulated in claim 1 of the opposed patent.

Accordingly, and as accepted by both parties, the only difference between the subject-matter of claim 1 of the patent in suit and document D2 is the deposition of an inorganic salt coat film comprising at least one of potassium sulphate and borax (borate) and free from chlorine (Cl) and fluorine (F) from an aqueous solution,

rather than the provision of a resin film, on the nickel layer.

Novelty, which is not in dispute, is thus provided with respect to document D2 by this feature.

2.2.2 *Problem to be solved*

The use of a synthetic resin containing halogens such as fluorine and chlorine as suggested in document D2 requires the use of solvents such as Freon, trichloroethylene and the like for dissolving the resin. These solvents are considered to be harmful to the environment. Furthermore, the resin is disadvantageous in that the low temperature annealing (tempering) after working the wire into a spring, which is an indispensable step in spring manufacture, causes the fluorine or chlorine in the resin to evaporate producing stinking gases which are harmful to the human body and can result in a discoloration of the spring (see patent, paragraphs [0006], [0013]). Furthermore, chlorine-containing coatings are known to produce corrosion of the wire surface (see eg also document D4, page 2, line 19 to page 3, line 1).

Accordingly, the objective problem to be solved relative to document D2 is to provide a coating without the above disadvantages in terms of pollution and corrosion.

The formulation of this problem is obvious in the board's judgement, given that the above pollution and corrosion problems would be readily apparent to the skilled person and were generally known in the art.

2.2.3 *Secondary Document D6*

Document D6 discloses a coating for drawing stainless steel and nickel alloy wires. The document is concerned with the problem of previously used salt coatings formed by immersion in concentrated solutions containing sodium chloride, borax and sodium metasilicate, that residual chloride on the wire after drawing can give rise to pitting corrosion (see column 1, lines 6 to 20).

The person skilled in the art in search of a solution to the problem identified at 2.2.2 above would, therefore, refer to this document.

The solution proposed in document D6 is a substantially silicate- and chloride-free salt coating, in particular a coating comprising potassium sulphate and/or borax (see column 1, lines 37 to 44; examples 1 to 3).

The skilled person would accordingly be lead by document D6 to replace the halogen containing resin of D2 by the above silicate - and chloride-free salt coating proposed in D6, thereby arriving at the subject-matter of claim 1 of the opposed patent.

2.2.4 The respondent proprietor argued that the skilled person would discard the teaching of document D6 as it did not relate to a nickel plated stainless steel wire and did not relate to coiling. The chemical and mechanical considerations involved were thus entirely different.

These arguments do not persuade the board. As submitted by the appellant opponent, the resin coating in document D2 was used both in the wire drawing and in the subsequent coiling process. The person skilled in the art would, therefore, also consider documents dealing with coatings for wire drawing such as document D6. Furthermore, the issue of pitting corrosion is addressed in document D6 in relation to both stainless steel and nickel alloy wires. The skilled person would therefore understand the document to be relevant to the nickel plated wires used in D2 for which a similar chemical and mechanical behaviour might be expected.

Moreover, the respondent proprietor argued that the actual problem addressed by the patent in suit was precision coiling and in particular reducing the spring free length variations. This problem was explicitly mentioned in the patent specification (see paragraph [0005] and was also apparent from the various examples given in the patent. In particular, it was clear from a comparison of examples J of document D2 (see D2, page 4, table 2) and example O of the patent (see patent, page 5, table 2), having the same steel composition, nickel plating thickness and surface roughness, that the salt coating provided a reduced spring free length variation (compare standard deviation and percent defective in tables 4 and 5 of D2 and the patent). In an attempt to solve this problem the skilled person would not refer to documents D4 to D6 which were not concerned with coiling. None of the remaining documents D1 and D3 suggested the solution claimed.

It is established jurisprudence as well as a matter of simple common sense that if it is obvious to do something for one reason, but not obvious it do it for another reason, the net result is that it is obvious to do it. Here, the presence of a further technical effect attributable to the use of the salt coating as claimed cannot render such use inventive if it is already obvious to use the salt coating for other reasons as set out above. This further technical effect merely constitutes what in the jurisprudence of the boards of appeal is commonly referred to as a "*bonus effect*" which cannot support the presence of an inventive step.

It is furthermore noted that in the present case there is no reason for redefining the technical problem to what the respondent put forward. Document D2 as closest prior art was correctly acknowledged in the application as originally filed and in the application the problem solved by the claimed spring-making method was in substance already appropriately identified as providing a coating without the halogen related disadvantages. A defensive problem-shifting argument is of no avail if the claim remains the same.

For the above reasons the subject-matter of claim 1 is obvious to the skilled person and, thus, lacks an inventive step within the meaning of Article 56 EPC.

The main request of the respondent proprietor is, therefore, not allowable.

3. *Auxiliary claim request of the respondent proprietor*

3.1 *Admissibility of the request*

The auxiliary request was submitted for the first time in oral proceedings before the board, and thus at a very late stage of the appeal proceedings, and without a valid reason for its lateness. Nonetheless, the board exercised its discretion to admit belated requests in this case in favour of the respondent proprietor, since the auxiliary request involved only the deletion of the method claims 1 and 2 from the claims as granted, and since renumbered claim 1, corresponding to claim 3 as granted, although including some additional features compared to claim 1 as granted, did not entail any substantially new discussion.

3.2 *Inventive step*

In document D2, the nickel plate layer, after drawing, has a thickness of 0.3 to 1.7 μm (see document D2, page 3, lines 13, 14), corresponding to the thickness specified in claim 1 of the auxiliary request which is directed to a spring, ie after drawing. Furthermore, in document D2 the tensile strength of the steel wire is specified to be at least 160 kgf/mm^2 and its surface roughness to be in the range from 0.8 s (0.6 to 0.9 μm) to 12 s (9 to 15 μm) (see document D2, page 2, lines 53, 54 and page 3, lines 15, 16), corresponding to what is additionally required in claim 1 of the auxiliary request.

It follows that, as accepted by both parties, also for claim 1 of the auxiliary request, the only difference

between the subject-matter of claim 1 and document D2 is the provision of an inorganic salt coat film comprising at least one of potassium sulphate and borax (borate) and free from chlorine (Cl) and fluorine (F), rather than a resin film, on the nickel layer.

In consequence, for the same reasons given above in respect of the main request, the subject-matter claim 1 of the auxiliary request is obvious to the skilled person and, thus, lacks an inventive step within the meaning of Article 56 EPC.

Hence, the respondent proprietor's auxiliary request is not allowable either.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

Registrar Chair

S. Sánchez Chiquero R. G. O'Connell