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D E C I S I O N
of 10 July 2001

Case Number: T 1143/97 - 3.2.6

Application Number: 88850122.8

Publication Number: 0294348

IPC: B23B 31/02

Language of the proceedings: EN

Title of invention:
Tool assembly, tool components and method of assembling said components

Patentee:
SANDVIK AKTIEBOLAG

Opponent:
Widia GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 54(2), 56

Keyword:
"Novelty (yes)"
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1143/97 - 3.2.6

D E C I S I O N
of the Technical Board of Appeal 3.2.6
of 10 July 2001

Appellant: (Opponent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 10 November 1997 rejecting the opposition filed against European patent No. 0 294 348 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: P. Alting van Geusau
Members: M. Bidet
M.-B. Tardo-Dino

Summary of Facts and Submissions

I. The respondent is proprietor of European patent No. 0 294 348.

The independent claims 1, 11 and 12 read as follows:

"1. Tool assembly comprising a first part and a second part comprising a tool or an adapter for a tool and a holder, said first part (12) having a truncated conical projection (15A-15G) facing the second part (11), said second part comprising a seat defined by a conical recess (25A-25G) in order to receive said projection, said assembly (10A-10G) further comprising means (19; 19'; 19''; 19''') for relative clamping of said first part against said second part, said assembly having a center line (CL), the projection (15A-15G) and the seat (25A-25G) comprising cooperative surfaces (16A-16G; 25'A-25'G) which are non-circular in cross-section, characterised in that said first part (12) has a first support surface (14) lying in a plane which is perpendicular to the center line (CL) and extends circumferentially 360 degrees around the base of said projection (15A-15G), said second part (11) comprising a second support surface (26) for abutment against said first support surface and extending circumferentially around the opening of said recess (25A-25G), that the projection (15A-15G) and the seat (25A-25G) in a cross-section normal to the center line have a three- or four-sided epitrochoidal profile, or a combination of semi-elliptic and a semi-circular profile, and in that the projection or the recess is expansible".

"11. A tool component of a tool assembly, said component (11) being a tool for chip removal or an

adapter for a tool or a holder for a tool, said component having a central conical recess (25A-25G) at an end thereof, a support surface (26), fastening means (19; 34, 35) and a center line (CL), wherein the recess is non-circular in cross-section taken perpendicular to the center axis (CL), characterised in that said component comprises a support surface (26) circumferentially around the opening of said recess, and that said cross-section has a three- or four-sided epitrochoidal profile, or a combination of a semi-elliptic and a semi-circular profile."

"12. A tool component of a tool assembly, said component (12) being a tool for chip removal, an adapter for a tool or a holder for a tool, said component having a central, truncated conical projection (15A-15G) at an end thereof, fastening means (24; 19'; 19''; 32) and a center axis (CL), wherein the projection (15A-15G) is non-circular in a cross-section taken perpendicular to the center axis (CL), characterised in that said component comprises a support surface (14) circumferentially around the base of said projection, and that said cross-section of the projection (15A-15G) has a three- or four-sided epitrochoidal profile, or a combination of a semi-elliptic and a semi-circular profile."

II. The patent was opposed by the appellant (opponent) on the grounds of lack of novelty and lack of inventive step (Article 100(a) EPC).

The following state of the art was essentially relied upon:

D1: EP-A-0 215 283

D2: GB-A-0 505 727

D3: EP-A-0 123 156

D4: Fachkunde Metall, 48. edition, pages 356, 357, 473 and Fachkunde Metall, 47. edition, page 2,3,252-255

D5: Dubbel, Taschenbuch für den Maschinenbau, 15.edition, 1983, pages 402-407, 1483,

D6: Technik-report 5, May 1985, pages 23-26, "Das Polygonprofil -die Wellen- Naben- Verbindung der 90er Jahre?", by Dr. A. Frank et al.

D7: Fortuna-Polygon-Verbindungen, Informationen der Fortuna Werke Maschinenfabrik GmbH, pages 1-31, undated.

III. The Opposition Division rejected the opposition by decision posted on 10 November 1997. It was of the opinion that the subject-matter of the independent claims of the patent as granted differed from the closest prior art as represented by D1 in that the cross-section of the conical projection and of the conical recess had a three- or four-sided epitrochoidal profile or a combination of a semi-elliptic and a semi-circular profile. In so far the subject-matter of claim 1 was novel (Article 100(a) with Article 54 EPC).

Inventive step of the subject-matter of claim 1 was acknowledged since no disclosure or indication was to be found in the documents of the state of the art concerning the use of a polygonal profile for mating the conical surfaces of the projection and the recess

as the patent required.

IV. On 22 November 1997 the appellant (opponent) lodged an appeal against this decision, the appeal fee being paid the same day.

In its statement of grounds of appeal which was filed on 5 March 1998, the appellant maintained the view that the claimed subject-matter lacked an inventive step when compared to the state of the art as disclosed in D1 to D7.

The appellant (opponent) requested that the decision under appeal be set aside, the patent be revoked in its entirety and requested Oral proceedings.

V. In a communication dated 20 October 2000, issued together with the summons to attend oral proceedings, the Board raised the question whether the claimed profiles led to different technical effects or were mere obvious substitutes for the polygon connections disclosed in D7.

VI. Following a request of the appellant filed with letter of 3 November 2000, for withdrawal of the oral proceedings scheduled on the 4 December 2000, the respondent stated that he had no objection to a cancellation of oral proceedings if the appeal were dismissed. It further indicated that a combination of the present main claim 1 with either of claims 2, 5, 7 and 9 were auxiliary requests to be considered at the scheduled oral proceedings if the patent could not be maintained without further amendments.

The respondent (patent proprietor) requested that the

appeal be dismissed and the patent be maintained as granted or in amended form on the basis of one of the above mentioned auxiliary requests (see letter of 13 November 2000, page 1, 3rd paragraph).

VII. With a communication dated 13 November 2000, the Board informed the parties of the cancellation of the oral proceedings.

VIII. The arguments submitted by the appellant in support of its request can be summarised as follows:

It was clear that, considering dependent claim 12 of D1 in combination with claim 1, the precise angular position of the head of the tool within the holder was obtained by the polygonal assembly, the position of which was not at all limited to the cylindrical part 3b (see Figure 2) of the projection of the tool head (see D1, page 6, lines 1 to 5) only but also to the conical parts 3a and 3c. Furthermore, in addition to the above disclosure of the single **specific embodiment** D1 also included a **general** disclosure on page 5, line 29 to page 6, line 1, according to which the possibility of realising the precise angular position was offered by the provision of a polygonal assembly between the head of the tool and its holder, so that the short conical portions should also have a polygonal profile cross-section.

Since the polygonal profile according to D1 solved the problems of centering the tool with the holder and the provision of a precise angular position as well as the transmission of the driving forces from the tool holder to the tool, D1 solved the totality of the objectives mentioned in the patent in suit.

D2, describing a further highly relevant tool assembly, lacked a stop surface but this feature was known from D3, last feature of claim 1, Figure 2, page 10, lines 17 to 32. Therefore, starting from D2 disclosing the features of the preamble of claim 1, the skilled person, in order to find a solution to the problems specified in the patent in suit, would have applied the solutions disclosed in D1 or D3. Knowing the structure of D1, it was apparent to the skilled person to provide the polygon assembly for transmitting the driving torque also in the short conical parts. Since D4 to D7 disclosed the specific claimed epitrochoidal profile, semi-elliptic/semi-circular profile and elliptic profile (see D7, page 12) for use as coupling means, it was evident to apply them for this purpose in, for example, D1. Although the semi-elliptic/semi-circular profile were not disclosed, but knowing that elliptic profile P2 were disclosed in D7, page 12, it would not entail inventive step of the skilled person to change one half of the elliptic profile for a semi-circular profile.

IX. The respondent contested the appellant's arguments and argued as follows:

D1 did not disclose conical sections having a polygonal profile. In particular there was a clear statement that the polygonal profile when providing a coupling between the tool head and its holder should be anywhere else but at the conical portions 3c and 4c.

As regards the remaining documents of the state of the art, D2 described the characterising features of claim 1. However, this document did not disclose support (axial abutment) surfaces between the tool and

its holder lying perpendicularly to the center line of the tool. With regard to D3 there was no polygonal profile with the projection (16). Documents D4 to D7 only related to polygonal profiles as such.

Since there was no suggestion in the available state of the art to provide a polygonal profile with a tool projection and corresponding holder recess having a conical cross-section combined with axial cooperating abutting surfaces in order to create and securely clamp the tool as well as to improve the wear resistance and positioning upon repeated clamping, this new combination was inventive.

Reasons for the Decision

1. The appeal is admissible.

2. *Novelty*

2.1 It was not disputed that the features of the preamble of claim 1 relating to a tool head and its holder recess both having a truncated conical shape when assembling the tool on its support, are disclosed in D1.

In particular, this known tool and holder have support surfaces lying perpendicularly to the axis of the tool assembly coming in axial abutment to each other when they are clamped. In this condition, at least the conical projection of the tool having the greater diameter and the mated conical recess of the holder define a precise axial positioning of the tool and further give, in cooperation with either a second

conical projection of smaller diameter or a cylindrical projection, a precise alignment of the tool with respect to the center line of the assembly.

2.2 The appellant submitted that D1 also disclosed that the polygonal profile connecting the tool head with its holder for transmission of torque could be arranged at the position of the conical sections 3a and 3c.

However, no basis is considered to be present in D1 for assuming that the conical sections 3a and 3c might have a polygonal profile. On the contrary, the description on page 6, lines 1 to 5 clearly establishes that a polygonal profile having a locking function should be arranged at a position, where no conical or guiding profiles are provided.

2.3 Since none of the other cited documents comes closer to the subject- matter claimed as D1, novelty of the subject-matter of claim 1 is concluded.

3. *Inventive step*

3.1 Starting from the known tool assembly represented by D1 the underlying problem to be solved by the patent in suit is to further simplify its construction while maintaining stable and secure clamping of the tool (see column 1, lines 30 to 34 of the patent in suit).

This problem is solved by the tool assembly claimed in claim 1 and tool components claimed in claims 11 and 12, in particular by providing a conical projection and corresponding seat comprising cooperating surfaces which are non-circular in cross-section. This also applies to the subject-matter of the independent

claims 11 and 12 of the patent in suit relating to each of the two components of the assembly (conical recess of the holder and conical projection of the tool respectively) having the corresponding essential features of claim 1.

3.2 As follows from the above considerations in respect of novelty, by indicating that a polygonal profile having a locking function should be arranged at a position where no conical profile is provided, D1 teaches away from using polygonal profile at the two conical surfaces of the projection and the recess.

3.3 As regards the disclosures of the documents D2 and D3 the Board agrees with the assessments of the Opposition Division in the decision under appeal.

A combination of teachings derivable from D1 and D3 cannot lead to the claimed subject-matter since D3 also lacks the disclosure or suggestion of a conical surface with a non-circular profile.

D2 indeed discloses such a combination of a conical surface and a non-circular profile but because it lacks the axial support surface and it relates to a different kind of tool assembly when compared to D1 or D3. Therefore, the axial position of the tool within the recess is not accurately defined in D2. Because of the different types of assembly, also as regards the extensive clamping length involved in D2, the skilled person is not led to combine the teaching of D2 with that of D1 or D3.

3.4 The appellant's opinion according to which D2 and D3 both related to the same type of tool, when taking into

account that for an exchange of tools normally the holder and tool were exchanged as a unit, also does not necessarily lead to adoption of the conical surface with the non-circular profile of D2.

With reference to page 2, lines 1 to 6, D2 leads away from tapering of the shank and holder when other provisions are made for taking the thrust and for preventing the drop out of the tool, thus merely leading to an arrangement in accordance with D1.

4. Summarising, in the Board's judgment, the proposed solutions to the technical problem underlying the patent in suit defined in the independent claims 1, 11 and 12 are inventive and therefore these claims as well as their dependent claims relating to particular embodiments of the invention in accordance with Rule 29(3) EPC, are acceptable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Patin P. Alting van Geusau