

Internal distribution code:

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

**Datasheet for the decision
of 3 September 2009**

Case Number: T 0425/07 - 3.2.06

Application Number: 95930766.1

Publication Number: 0777545

IPC: B23C 5/10

Language of the proceedings: EN

Title of invention:

Shaft tool with detachable top

Patentee:

Sandvik Intellectual Property AB

Opponents:

Iscar Ltd.
CERATIZIT Austria Gesellschaft m.b.H.

Headword:

-

Relevant legal provisions:

EPC Art. 123(2)
RPBA Art. 13(1)

Relevant legal provisions (EPC 1973):

EPC Art. 56, 84

Keyword:

"Sole request - admittance (yes); inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 0425/07 - 3.2.06

D E C I S I O N
of the Technical Board of Appeal 3.2.06
of 3 September 2009

Appellant: Sandvik Intellectual Property AB
(Patent Proprietor) SE-811 81 Sandviken (SE)

Representative: Stein, Jan Anders Lennart
Groth & Co. KB
P.O. Box 6107
SE-102 32 Stockholm (SE)

Respondent: Iscar Ltd
(Opponent OI) P.O. Box 11
IL-Tefen 24959 (IL)

Representative: Vossius & Partner
Siebertstrasse 4
D-81675 München (DE)

(Opponent OII) CERATIZIT Austria Gesellschaft m.b.H.
A-6600 Reutte/Tirol (AT)

Representative: Lohnert, Wolfgang
Lähn 12
AT-6600 Breitenwang/Reutte (AT)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 16 January 2007
revoking European patent No. 0777545 pursuant
to Article 102(1) EPC 1973.

Composition of the Board:

Chairman: P. Alting Van Geusau
Members: M. Harrison
W. Sekretaruk

Summary of Facts and Submissions

I. Following remittal of the case to the opposition division for further prosecution in accordance with the order in T 491/03, the opposition division subsequently revoked European patent number 0 777 545 with its decision of 16 January 2007.

II. The appellant (patent proprietor) filed an appeal against this decision and requested maintenance of the patent in an amended form based on its main request or alternatively one of a series of auxiliary requests.

Together with its appeal grounds, the appellant filed a declaration (entitled "affidavit") by Dr. Brandt, a CD containing video sequences and samples of indexable inserts of different materials.

III. Each of the respondents (Opponent OI and Opponent OII) requested dismissal of the appeal.

In their written submissions, the respondents made reference *inter alia* to the following documents:

E1: JP-05-96415 and English translation thereof
E2: US-A-4 958 965
E4: US-A-3 933 210
E6: FR-A-2 602 162
E8: US-A-5 114 286

IV. With its summons to oral proceedings, the Board included an annex stating its provisional opinion, whereby objections to the claims of all requests in view of *inter alia* Article 123(2) EPC were mentioned.

V. In its reply dated 8 June 2009, the appellant replaced all its previous requests by a new main request and seven auxiliary requests.

VI. During the oral proceedings held before the Board on 3 September 2009, the appellant withdrew all previous requests and filed a single request (labelled "first auxiliary request") upon which maintenance of the patent in an amended form was requested.

The respondents confirmed their previous requests that the appeal be dismissed.

VII. The sole claim reads as follows:

"Ball end mill for metal cutting machining comprising an operative cutting portion (1) and a shaft portion (2), wherein the cutting portion (1) is made as an integral cemented carbide body of one single injection moulded piece comprising a rotation axis and a cutting edge-provided part (3) for engagement with a workpiece and a threaded part (4) which is threaded into a hole (8) with a corresponding threaded part in the shaft portion (2), wherein the threaded part and the corresponding threaded part of the hole in the shaft portion comprises co-operating radial (11, 12, 13, 14) abutment surfaces, respectively, disposed at both axial ends of each of said threaded part and said corresponding threaded part, and one pair of co-operating axial abutment surfaces (15, 16) for the stabilization of the fixation of the cutting portion in the shaft portion, wherein on one hand a ring-shaped shoulder (15) which is located in a radial plane,

between the part (3) of the cutting portion which part is provided with cutting edges, and the thread part (4), and on the other hand a ring-shaped end surface (16) that cooperates with the former, said surface (16) being on the shaft portion (2) function as axial abutment surfaces, wherein said cutting edge provided part (3) has helically twisted main cutting edges (5) and end cutting edges (6) which extend into said rotation axis, wherein a chip flute (7) extends between each pair of adjacent main cutting edges (6), wherein the cutting portion (1) is provided with a short cylindrical intermediate portion arranged directly at said cutting edge provided part (3) and arranged directly at one of said radial abutment surfaces (11), said cylindrical intermediate portion (9) being provided between the cutting edge-provided part (3) and the threaded part (4), said cylindrical intermediate portion (9) having one or more recesses (10) intended to function as key grips, for a suitable key for tightening and untightening, respectively, of the cutting portion (1)."

VIII. The appellant's arguments may be summarised as follows:

The claim was a combination of the claim found to meet the requirements of Article 123(2) EPC and Article 84 EPC 1973 in previous case T 491/03, together with the disclosures taken from paragraphs [0011] and [0016] of the patent and from Figure 1 regarding the exact location of the intermediate portion (9).

Starting from E1, which disclosed nothing concerning stability with respect to any of its facing surfaces, the objective problem to be solved was one of providing

improved stability in a simple manner whilst allowing simple but secure tightening of the tool. In the claimed ball end mill, radial abutment surfaces at both ends of the cutting portion were provided as well as an axial abutment surface, known as such from E8, such that a high amount of friction would be developed at each of these three surfaces upon tightening of the cutting portion into the shaft portion. The dedicated wrench used for tightening in E1 had to be applied to the cutting edge portion of the tool, which was problematic and could even lead to breakage, particularly regarding the high frictional force occurring due to the three abutment surfaces. It was not obvious to alter the construction in E1 by providing an intermediate portion with key grip recesses as defined in claim 1, in particular because the inclusion of any intermediate portion would require a break in the otherwise continuous cutting edge arrangement which would have serious negative consequences when machining a workpiece due to the tool functionality. E2, E4 and E6 did not disclose key grip recesses which could be applied to E1 to arrive at the invention without inventive step, because not only did E4 and E6 concern substantially different tool arrangements but any key grip recesses in these documents were arranged in such a way which was incompatible for inclusion within E1.

IX. The arguments of respondent/opponent OI may be summarised as follows:

The request was late-filed as it was only filed during oral proceedings, and thus should not be allowed into proceedings. The wording of the claim was also unclear

since the location of the intermediate portion "directly at one of said radial abutment surfaces" was incorrect when considering the embodiment in Figure 1 for example where the axial abutment surface 15, not the intermediate portion 9, was adjacent the radial abutment surface 11.

The amendment introduced into claim 1 was allegedly derivable from Figure 1 but not all the features of Figure 1, such as the conical thread, were defined in claim 1 so that the requirements of Article 123(2) EPC were not met.

The subject matter of claim 1 also lacked an inventive step when starting from E1. The features of the claim which solved the problem of providing more stability compared to E1, namely the provision of a further radial abutment surface, were obvious from general mechanical considerations and known from E8 which disclosed the requirement for maintained alignment during use of a rotating tool, which was the same as a requirement for stability. The features of claim 1 concerning the recesses were disclosed in the patent in paragraph [0016] merely for the purposes of simplifying tightening and loosening by a key and not in relation to the problem of stability. Separate problems were thus involved. Recesses for key grips on the tool head were known from e.g. E2, E4 or E6 and this feature could be applied to E1 without involving any inventive step. Even though the cutting edges or chip flute surfaces might be interrupted in E1 by the addition of such a feature, any such interruption, which could be kept very small anyway, would be taken into account entirely by using a design whereby the key grip

recesses were located outside of the cutting edges or chip flutes, i.e. at a position below the entire cutting edges. This solution, as in e.g. E6, whereby the whole cutting portion (including all the cutting edges) was located above but on the same portion as the key grip surfaces, would be used without inventive step in the tool of E1. Starting from E1 the problem could alternatively be regarded as being that of finding a means for replacing the entire cutting portion rather than just replacing the tip portion, whereby the solution taught in E6 also rendered the subject matter of claim 1 obvious.

- X. The arguments of respondent/opponent OII may be summarised as follows:

In addition to the arguments of respondent/opponent OI and regarding the differences of claim 1 compared to E1, claim 1 defined nothing more than a solution to two separate problems, one of stability and one of ease of tightening. The stability problem was solved by the teaching of E8 in an obvious manner and the unrelated problem of ease of tightening merely involved arranging key recesses at a suitable location which was entirely normal practice. Claim 1 defined nothing more. E2, E4 and E6 each taught a solution to this problem and it would therefore be obvious for a skilled person to apply key grip recesses as known from these documents to a two-piece ball end mill as in E1 without using inventive skill.

Reasons for the Decision

1. *Amendments*

1.1 *Admittance of the request into proceedings*

The request was made during oral proceedings before the Board on 3 September 2009 and was thus filed late. However, the subject matter of claim 1 corresponded to a great extent to claim 1 of the sixth auxiliary request as filed already with the grounds of appeal, even though amendments were introduced to overcome objections arising primarily during oral proceedings in relation to Article 123(2) EPC and Article 84 EPC 1973.

Since the amendments did not however change the subject matter to be considered markedly from the request filed already with the grounds of appeal, at least in as far as its consideration with respect to inventive step was concerned, and since the objections made during the oral proceedings under Article 84 EPC 1973 and Article 123(2) EPC were overcome by said amendments, the Board exercised its discretion in accordance with Article 13(1) of the Rules of Procedure of the Boards of Appeal to allow the request into proceedings.

Although the respondents objected to the introduction of the request as being late filed, and also based on an alleged lack of clarity and an alleged lack of disclosure in the application as originally filed, the Board found that the latter two objections were unfounded (see below) and the objection of being late-filed was not by itself decisive in view of the requests already filed with the grounds of appeal.

Since no further objections were made by either of the respondents as to why such a request should not be admitted into proceedings, the Board found that the respondents' objections did not give rise to a need to exercise its discretion differently.

1.2 *Article 84 EPC 1973*

The respondent objected that claim 1 lacked clarity, because it defined that the intermediate portion (9) was directly at one of the radial abutment surfaces, whereas Figure 1, from where the amendment was taken, depicted the abutment surface 15 between the intermediate portion (9) and the radial abutment surface (11). However the Board is not convinced by this argument, since the axial abutment surface (15) is merely part of the intermediate portion (9), namely its lower surface, whereby the intermediate portion (9) is, as stated in the claim, arranged directly at one of the radial abutment surfaces (whereby radial abutment surface 11 is the only possible surface of the two radial abutment surfaces defined). The Board also concludes that it is not possible that the axial abutment surface 15 could be understood as being anywhere else than is shown in Figure 1, because a placement of the axial abutment surface above the intermediate portion (9) would not correspond to the wording of the claim according to which the intermediate portion (9) is directly at said cutting edge provided part, while at the same time the abutment surface must also be able to abut against the ring-shaped end surface (16) on the shaft portion, into which namely the radial abutment surface (11) must enter. Likewise, the axial abutment surface could not

be positioned below the radial abutment surface (11) because this would prevent surface (11) entering into radial abutment with the cooperating inner surface (13) on the shaft portion (2).

Since no further objections were raised under Article 84 EPC 1973 against the claim, and the Board has found no further reason itself to object, the Board finds that claim 1 fulfils the requirements of Article 84 EPC 1973.

1.3 *Article 123(2) EPC*

1.3.1 Claim 1 is based on the version of claim 1 found to meet the requirements of Article 123(2) EPC, as remitted back to the opposition division in case T491/03, up to and including the wording "...function as axial abutment surfaces", with the amendment of the introductory term "End mill" to read "Ball end mill" and by the introduction of "a rotation axis and" to provide an antecedent for the reference to the rotation axis defined later in the claim. The wording of the claim which follows the wording "...function as axial abutment surfaces" is based on paragraphs [0011] and [0016] of the patent which correspond to page 2, line 31 to page 3, line 6 and page 4, lines 28 to 35 of the application as filed, as well as on the specific arrangement of the threaded part 4, the radial abutment surface 11 and the cylindrical intermediate portion 9 shown in Figure 1.

1.3.2 The respondent/opponent OI argued that the amendments introduced into claim 1 from paragraph [0016] related to the specific embodiment of Figure 1 and that all the

features in the Figure had to be included in order not to define an unallowable intermediate generalisation of the combined set of elements shown in combination. However, the Board finds that the features of the claim concerning the recesses (10) which are intended to function as key grips have, unambiguously for a skilled person, no functional relationship to other features of the ball end mill depicted in Figure 1, apart from those that are now in the claim. Thus, for example, whilst the threaded part extends conically in Figure 1, this bears no functional relationship to the arrangement of the other surfaces around it, and the form of the thread and the extension of the thread are anyway preferable features (see e.g. column 2, lines 41 to 56 of the patent and page 3, lines 7 to 25 of the application as filed). In as far as the specific configuration in Figure 1 of the cutting edge provided part 3, the cylindrical portion 9 and the radial abutment surface 11 with axial abutment surface 15 are concerned, the definition in claim 1 is found to specify the functional relationship of these various elements arising therefrom (see also comments under Article 84 EPC 1973 above), such that no subject matter beyond that in the originally filed application has been included. The Board also finds that no other features visible in Figure 1 have any functional relationship with those features already defined which would require their definition in the claim, when taking into account the knowledge of a skilled person.

1.3.3 The requirements of Article 123(2) EPC are therefore met.

2. *Inventive step*

2.1 All parties agreed that the closest prior art was represented by E1 and the Board agrees.

2.2 The parties however disagreed as to:

(i) whether E1 discloses one pair of radial abutment surfaces at one end of the threaded part;

(ii) whether E1 discloses an axial abutment surface formed by a ring-shaped shoulder;

(iii) whether E1 discloses a cemented carbide body.

As regards item (i) above, E1 does not state that the cylindrical portion which is directly adjacent to the cutting tip lower edge is a radial abutment surface able to radially abut with a corresponding radial abutment surface in the tool shaft. However, for a skilled person, it is implicit that the cylindrical portion is sized to fit into the recess provided in the shaft portion in order for proper engagement of the threaded parts. Further, a sizing of the outer diameter of this cylindrical portion which would not provide radial abutment would be technically inappropriate in terms of normal design considerations for a rotating tool of this type. Thus this feature is implicit in E1.

As regards the second item (ii), both the lower face of the cylindrical portion forming the radial abutment surface mentioned in regard to item (i) above, and the lower face of the tip portion where the cutting edges terminate, are in the form of a ring-shaped shoulder

and one of these will abut axially with its corresponding "ring-shaped end surface" on the shaft portion, since a fixation of the two parts together whereby neither of the aforementioned ring-shaped surfaces abuts axially would leave the tool prone to severe stability problems. Thus this feature is also implicit in E1.

Concerning item (iii), the ball end mill in E1 is made as an injection moulded product which may be of a tool material "such as a ... cermet, which is utilized in a machining tool such as a milling machine" (see paragraph [0001]). The Board finds that it is unnecessary for consideration of the issue of inventive step to determine whether the term "cemented carbide" as claimed is limited to materials distinct from a "cermet" as disclosed in E1 or whether the term "cemented carbide" includes cermets as a subgroup therein, since irrespective of the conclusion on this matter the Board finds that it is anyway obvious in respect to the subject matter claimed to substitute e.g. a tungsten carbide based mill (which is undoubtedly a cemented carbide mill) for a titanium carbonitride based mill (referred to by some sources specifically as a "cermet" mill), particularly as both can be injection moulded. Any difference in properties between e.g. titanium carbonitride mills and e.g. tungsten carbide based mills with respect to moulding characteristics or with respect to machining effects obtained are entirely irrelevant when considering inventive step in respect of the ball end mill as defined in claim 1.

- 2.3 The subject matter of claim 1 also differs over E1 due to the features that the "cutting portion (1) is

provided with a short cylindrical intermediate portion arranged directly at said cutting edge provided part (3) and arranged directly at one of said radial abutment surfaces (11), said cylindrical intermediate portion (9) being provided between the cutting edge-provided part (3) and the threaded part (4), said cylindrical intermediate portion (9) having one or more recesses (10) intended to function as key grips, for a suitable key for tightening and untightening, respectively, of the cutting portion (1)".

Instead E1 discloses (see paragraph [0009]) a ball blade that can be replaced "using a dedicated wrench". From this paragraph it would be immediately understood that such a wrench would act on the flutes between the cutting edges of the ball blade to loosen and tighten it and this was also not disputed by the parties.

2.4 Starting from E1, there are two problems to be solved by the aforementioned differing features.

The first is a problem of improving stability between the cutting end portion and the shaft portion, and the second is the problem of tightening the tip portion (ball blade portion) on to the shaft portion. The parties also did not dispute this.

2.5 Regarding the first problem of improving the stability of the connection between the cutting tip and the shaft (see also paragraph [0013] of the patent), the skilled person would turn to E8 where the axial alignment of two connected parts of a rotating tool is addressed. In E8 (see e.g. column 2, line 60 to column 3, line 12) the bending, twisting and relative movement which may

lead to misalignment of the parts are explained, and the Board concludes that these effects relate to the same requirements as apply to the stability of the connection in the present case. This problem is solved in E8 (see e.g. column 7, line 51 to column 8, line 43) by the use of radial abutment surfaces 43 and 41 at the axial ends of an externally threaded (male) tool part which closely fit with corresponding radial abutment surfaces 29 and 31 of an internally threaded (female) tool part, and by a series of axial abutment surfaces (e.g. cooperating surfaces 45 and 25) on the respective male and female parts.

2.6 Although E8 relates to cutting tools and in certain embodiments to gun drills and the connection of axial extensions therefor (see e.g. column 1, lines 6 to 11 and column 2, lines 60 to 67), the objective problem when starting from E1 does not concern the tool type, but is merely related to the stability of the connection between rotating tool parts. When starting from E1, the skilled person would thus turn to E8 and combine this therewith when trying to solve the problem of providing improved stability.

2.7 Turning now to the second problem which relates to providing a solution for allowing easier tightening of the cutting tip into the shaft portion of a tool, this also relates to the higher friction which would occur due to a stable connection of this type. In other words, when combining E1 with the teaching of E8, this would provide higher friction than the solution proposed in E1 alone, due to the radial and axial abutments of E8 which need to be used in E1. The first and second problems are thus not entirely separate problems and

whilst the provision of recesses is not disclosed in the patent as being a problem involved with a stable connection, it is clear for a skilled person that the provision of a more stable connection in E1, in the manner defined in claim 1, gives rise to greater friction during assembly of the cutting portion and the shaft.

2.8 However, none of the cited prior art disclosing solutions involving the use of recesses for a suitable wrench would lead a skilled person to a solution as defined in claim 1 when starting from E1, as explained *infra*.

2.9 The ball end mill in E1 is formed in two portions which are screwed together, whereby the two portions are specifically (i) a tip or blade portion and (ii) a shaft portion. Importantly, both of these portions are provided with cutting edges (see e.g. the key to the Figures which states that reference numeral 2 is a cutting blade ridge). To allow the functionality of such a tool for its intended purpose, the connection between the parts is such that axial abutment must occur between these two portions whereby also the blade ridges and chip flutes on the ball end should coincide accurately with those on the shaft portion without leaving a gap therebetween (which would otherwise be prone to blockage with removed metal etc.). The equal axial dimension of the cooperating radial abutment surfaces on the tip and shaft portions as shown in Figure 1 of E1 is also evidence of this relationship even if by itself not decisive. Moreover, when starting from E1 and combining this with the teaching of E8 to achieve the required stability, the stable connection

formed between the two parts uses an axial abutment of the type shown in E8. This connection involves a buttress flange 45 on one part abutting with the outermost end surface 25 (see E8, e.g. column 8, lines 65 to 68) on the other part. When this arrangement is included in E1, access is then only possible to the exterior surfaces of the tool. Due to this, access to any recesses which might be arranged on an intermediate portion below the tip edges, would be prevented. Tightening of the tool parts together by using a key on any such recesses would therefore not be possible.

2.10 Thus, whilst it is known from e.g. E2 (see e.g. Figure 3 and column 1, lines 64 to 66 and column 2, lines 40 to 42) that an external surface having recesses may be provided below the cutting edges on a tip in the form of a "key handle 32" which may be used for tightening and loosening, such a solution cannot be applied to the arrangement shown in E1 without entirely altering the cutting edge arrangement therein, especially not when taking the arrangement provided by a combination of E1 and E8 into account. The same reasoning applies to the combination E4 or E6 with E1 and E8, whereby for example it is noted that E4 indeed discloses a slot below the cutting head for engagement with a wrench, but whereby the shaft portion has no cutting edges matching with those of the cutting head which, if present as in E1, would prevent such an arrangement.

2.11 The respondents also argued that the tool structure in E1 could be replaced by a different two part structure, whereby the entire tool cutting edge portions of E1

could be arranged on one tip portion and the other portion should merely be made as a shaft portion with no cutting edges but merely provided with internal threads, such as in E6 or E4. However, the Board finds this argument unconvincing, since such an approach would involve an entire reconstruction of the E1 tool, for which there is no basis unless hindsight is used, not least since such a restructuring of the E1 tool would defeat the basic purpose of E1 concerning the replacement of the end part (i.e. the ball blade) of the ball end mill which is made of an injection moulded cermet.

2.12 Consequently, whilst each of E2, E4 and E6 shows recesses of some type provided on a tool tip portion which recesses may be engaged by a suitable key, each of these solutions is incompatible with the structure of the ball end mill shown in E1, in particular since E1 must already be combined with E8 in the manner defined in claim 1 in order to solve the problem of stability.

2.13 Thus, starting from E1, and in light of the prior art cited, the subject matter of claim 1 involves an inventive step. The requirement of Article 56 EPC 1973 is therefore fulfilled.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent with the following documents:

claim 1 and description columns 1 to 4 of 3 September 2009, together with Figures 1 and 2 as granted.

The Registrar:

The Chairman:

V. Commare

P. Alting van Geusau