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D E C I S I O N
of 30 November 1993

Case Number: T 0449/91 - 3.2.5

Application Number: 84850349.6

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Title of invention:
Chip cutting tool

Patentee:
Seco Tools AB

Opponent:
Iscar Limited

Headword:
-

Relevant legal norms:
EPC Art. 56

Keyword:
"Inventive step (yes)"

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0449/91 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 30 November 1993

Appellant: (Proprietor of the patent)
Seco Tools AB
Fack
S-773 01 Fagersta (SE)

Representative:
Lieke, Winfried, Dr.
Weber,. Dieter, Dr.,
Seiffert, Klaus, Dipl.-Phys.-
Lieke, Winfried, Dr.,
Postfach 61 45
D-65051 Wiesbaden (DE)

Respondent: (Opponent)
Iscar Limited
Industrial Zone
North Nahariya
Israel

Representative:
Miller, Joseph
J. Miller & Co.
34 Bedford Row
Holborn
London WC1R 4JH (GB)

Decision under appeal: **Decision of the Opposition Division of the European Patent Office dated 2 May 1991 revoking European patent No. 0152729 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: C.V. Payraudeau
Members: H.J. Seidenschwarz
A. Burkhart

Summary of Facts and Submissions

I. The Appellant (Proprietor of the patent) appealed against the decision of the Opposition Division, by which the European patent No. 0 152 729 concerning a "Chip cutting tool" had been rejected on the ground that the subject-matter of Claim 1 did not involve an inventive step.

II. Oral proceedings were held.

(i) The Appellant requested that the decision under appeal be set aside and that the patent be maintained as granted. The Respondent (Opponent) requested that the appeal be dismissed.

(ii) Claim 1 of the patent as granted reads as follows:

"A chip cutting tool, preferably a parting or groove cutting tool, comprising a holder body (10), a clamping arm (12) attached to said holder body, preferably integrally therewith, a cutting insert (11), said cutting insert being clamped by means of said clamping arm in an insert site in said holder body (10) between a first supporting surface (13) on the holder body (10) cooperating with a first edge surface (20) of the cutting insert (11) and a second supporting surface (14) on the clamping arm (12) cooperating with a second edge surface (19) of the cutting insert (11), said clamping arm (12) being adapted to rest against the cutting insert (11) in a generally bent state and clamp the cutting insert (11) by means of the resilient force arising from the bending of the clamping

arm (12), and that an edge surface (19) of the cutting insert (11) opposed to said first supporting surface (13) includes a plurality of mutually inclined portions (15, 16) that are intended to slide against said second supporting surface (14) during insertion of the cutting insert (11) into said insert site while simultaneously bending the clamping arm (12), said portions being mutually designed such that a larger bending of the clamping arm (12) is obtained up to the entering of the final phase of the insertion of the cutting insert (11) than during the final phase thereof, whereby the beginning of the final phase being defined by a breakpoint (c) between two portions (15, 16) of the edge surface (19), and the cutting insert (11) is provided with an abutting surface (17) which is adapted to define the final position of the cutting insert (11) in the holder body (10) by abutment against end surface (18) on the clamping arm (12), characterized in that said end surface (18) being located more closely to the most forward end of the clamping arm (12) than the second supporting surface (14), in that said cooperating surfaces (13, 20, 14, 19) being V-shaped in cross-section, and in that the area of clamping contact in the final position between the clamping arm (12) and the edge surface (19) is located between the breakpoint (c) and the cutting edge of the cutting insert (11)."

(iii) The following documents already referred to in the opposition proceedings were considered as essential by the parties:

D1: EP-A-0 059 602,
D2: EP-A-0 095 062, and
D13: Certified Declaration by Dr. Rafael Westheim of 20 November 1990.

(iv) The parties agreed that the embodiment of the chip cutting tool shown in Figure 16 of document D2 represents the closest state of the art within the meaning of Rule 29(1)(a) EPC.

(v) The Appellant argued, referring to page 1, line 23 to page 2, line 27 of document D2, that the end surface formed on the clamping arm of the tool holder of document D2 was essential for increasing the clamping force acting on the cutting insert in proportion to the cutting force when this latter force acts on the cutting insert and that this feature was common to all embodiments disclosed in document D2.

Therefore, considering the embodiment according to figure 16 of document D2 as representing the closest prior art, the problem to be solved was to provide a cutting tool in which the clamping forces are independent of the cutting forces but are high enough to keep the cutting insert in place in all cases.

The present invention as claimed in Claim 1 of the patent in suit solved this problem by using a flexible clamping arm such as known from document D2 in combination with an abutment provided at the forward end of the clamping arm.

Document D1, although it disclosed a chip cutting tool having a forwardly located abutment surface formed on the cutting insert, was using a holder body having two jaws which were rigid since the cutting insert was retained in place by forces of compression exerted by said jaws (see page 4, lines 18 to 20 of the description of document D1). Furthermore, high machining forces were necessary to push the cutting insert into the recess formed by the two jaws.

Therefore, the combination of the two different kinds of cutting insert and holder body disclosed respectively in documents D2 and D1 was not possible.

(vi) The Respondent contested the above arguments. In particular, he argued that the clamping device claimed in Claim 1 of the patent as granted showed the same conditions with respect to the forces acting on the cutting insert during its initial and final mounting phase and during the working phase of the chip cutting tool as the clamping device known from figure 16 of document D2. Moreover, as indicated in Claim 1 of this document the cutting insert of the known device was not necessarily indexable. Therefore, the positioning of the abutting surface of the lever at the rear end of the clamping arm was only a possibility and not a necessary feature. It was true that the feature concerning the positioning of the area of clamping contact between the break point and the cutting edge of the cutting insert was not known from document D2. However, this feature was known from the clamping device disclosed in document D1. Therefore, the person skilled in the art would without any difficulty

and without any inventive effort transfer the abutting surface to the forward end of the cutting insert.

(vii) According to the Respondent, document D13 shows a chip cutting tool which corresponds to the one disclosed by document D1. The top jaw of the cutting tool shown in document D1 is higher than the corresponding jaw of the cutting tool shown in the photographs of document D13. The difference results however only from the manufacturing conditions of the cutting tool and is in fact so small that it does not influence the function of the jaws with respect to the clamping forces. The Appellant did not object to this explanation.

Reasons for the Decision

1. The appeal is admissible.

2. None of the available documents discloses a chip cutting tool comprising all the features as specified in Claim 1 of the patent as granted. Since this has not been disputed by the Respondent there is no need for further detailed substantiation of this matter.

3. *Closest state of the art, technical problem and solution*

3.1 The preamble of Claim 1 of the patent as granted is derived from the chip cutting tool disclosed in the figures 15 to 19 of document D2 since all the technical features being part of this prior art are mentioned in said preamble. According to the description of document D2 (see page 15, lines 4 to 13), during the mounting

phase of the cutting insert, one of the oppositely inclined ramp surfaces (Gleitrampen 35) formed on one of its edge surfaces is brought into sliding engagement with the corresponding supporting surface formed on the clamping arm, whereby the latter is simultaneously bent, which results in an **initial clamping force** (Klemmvorspannung) exerted on the cutting insert when the breakpoint formed between the two ramps is reached by said supporting surface. In this final position of the clamping arm, the **final clamping force** acting on the edge surface of the cutting insert is created by the thrust of this inner end surface against a lever formed on the clamping arm which forces the latter in the direction of the cutting insert, thus increasing the **initial clamping force**. The thrust force is produced in reaction to the cutting forces acting on the cutting edge of the cutting tool in use and depends therefore on these forces.

3.2 Therefore, the technical problem to be solved is to provide the chip cutting tool according to document D2 with clamping means which maintain a **high clamping force independent of any cutting forces.**

3.3 According to the teaching of Claim 1 of the patent as granted, this problem is solved in that the cutting insert comprises on one of its edge surfaces an inclined ramp surface which is brought into sliding engagement with a corresponding supporting surface formed on the clamping arm, which is thus initially bent until the summit of the ramp (breakpoint) is reached and the practically **final clamping force** is attained. Thereafter, the cutting insert slides further into the holder body until the abutment formed at the forward end of the cutting insert abuts against a corresponding abutment formed on the clamping arm without substantially increasing the **final clamping force.**

This permits the location of the area of the clamping contact between the holder body and the cutting insert in the final position of the latter between the breakpoint and the cutting edge of the cutting insert. Thus, the clamping arm clamps the cutting insert only by means of the resilient force arising from the bending of the clamping arm which is applied in a predetermined area on the forward portion of the cutting insert. Such a concentration of the resilient force results in maintaining a high **clamping force** which is not sensitive to the **cutting forces** acting either radially inwardly or outwardly of the clamping site. In this case there is no relation between the **clamping force** acting on the cutting insert in its final position on the one hand and the **cutting forces** on the other hand. An increase in the **cutting forces** neither causes an increase in the **clamping force**, nor generates a shifting of the cutting insert.

The location of the area of the clamping contact as specified in Claim 1 allows the location of the abutting end surface of the clamping arm closely to its forward end in such a manner that it is used in combination with the abutting surface of the cutting insert only for defining the final position of the cutting insert in the holder body. Finally, the V-shaped cross-section of the co-operating surfaces of the holder body, clamping arm and cutting insert improve the lateral support of the cutting insert in said holder body.

4. *Inventive step*

4.1 According to the teaching of document D2, the chip cutting tool shown in figures 15 to 19 relies merely on the concept of using the **cutting forces** for clamping the cutting insert in its final mounting position by

increasing the **initial clamping force** produced by the supporting surface of the clamping arm when this supporting surface has reached its **final position on the breakpoint**.

4.2 The chip cutting tool disclosed in document D1 uses **wedge clamping** concept. More particularly the holder body of this cutting tool comprises a recess defined by jaws having supporting surfaces which are V-shaped in cross-section. The jaws are at a first angle and are pressed against V-shaped edge surfaces formed on the cutting insert which are at a slightly larger angle. The cutting insert is provided with an abutting surface adjacent the cutting edge which abutting surface matches with an end surface of the corresponding jaw for limiting the displacement of the cutting insert in the recess when the cutting insert is pushed into this recess by machining forces.

4.3 The known prior art clamping systems therefore cannot suggest to the person skilled in the art the essential characteristic of the patent in suit, according to which (1) the area of the clamping contact between the supporting surface of the clamping arm and the co-operating edge surface of the cutting insert is located between the breakpoint formed by the mutually inclined portions and the cutting edge of the cutting insert, and (2) the final position of the cutting insert is defined by abutment of the abutting end surface formed at the forward end of the cutting insert against a corresponding surface of the clamping arm with the result that **only the resilient force** arising from the bending of the clamping arm is used to clamp the cutting insert in its final mounting position **irrespective of the cutting forces.**

4.4 There is no need to examine the document D13 since according to the Respondent's submission, not contested by the Appellant, the cutting tool shown in this document corresponds to the tool disclosed in document D1 with only minor manufacturing differences.

4.5 The other available documents likewise give no hint of the subject-matter of Claim 1 of the patent as granted. Their teachings could not, either alone or in combination with the teachings of the documents discussed in the foregoing paragraphs, lead the person skilled in the art to a chip cutting tool according to said Claim 1.

4.6 Therefore, the subject-matter of Claim 1 involves an inventive step.

5. In view of the above, the patent as granted can be maintained with Claim 1 together with the dependent Claims 2 to 10 concerning particular embodiments of the subject-matter of this claim.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained as granted.

The Registrar: The Chairman:

A. Townend C. Payraudeau