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D E C I S I O N
of 26 November 1998

Case Number: T 1086/96 - 3.2.1

Application Number: 89311745.7

Publication Number: 0370674

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Language of the proceedings: EN

Title of invention:
Drill screw

Patentee:
Yugen Kaisha Shinjoseisakusho

Opponent:
SFS stadler Befestigungs- und Umformtechnik AG

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1086/96 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 26 November 1998

Appellant: (Opponent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 16 October 1996 concerning maintenance of European patent No. 0 370 674 in amended form.**

Composition of the Board:

Chairman: F. Gumbel

Members: M. Ceyte
V. Di Cerbo

Summary of Facts and Submissions

I. The respondent is proprietor of European patent No. 0 370 674 (application No. 89 311 745.7).

II. The patent was opposed by the appellant (opponent) on the ground of lack of inventive step.

The following state of the art was inter alia cited:

D2: DE-A-2 019 040

D5: WO-A-88/05991

D7: US-A-4 736 481

D8: US-A-1 004 795.

III. By an interlocutory decision posted on 16 October 1996 the opposition division maintained the patent in amended form.

IV. On 12 December 1996 the appellant (opponent) lodged an appeal against this decision, with the appeal fee being paid at the same time.

The statement of grounds of appeal was filed on 12 February 1997.

V. Oral proceedings before the Board of Appeal were held on 26 November 1998.

The respondent requested that the patent be maintained on the basis of the following documents:

- claims 1 to 3 and description presented at the oral proceedings, and
- drawings as granted.

Amended claim 1 reads as follows:

1. A drill screw comprising:

a first shank (11) of diameter D made of metal unsusceptible of hardening;

a driving head (13) extending from an end of the first shank (11) and engageable with a screw driving tool;

a flat surface formed at the other end of the first shank extending perpendicular to the longitudinal axis of the first shank;

a second shank (12) made of a metal susceptible of hardening and of the same diameter as the first shank, the second shank (12) being secured to the flat surface to provide a zone (16) at the other end of the first shank (11);

a drill bit (21) formed by cold forging at the other end of the second shank; and

a continuous thread (23 and 23a) extending on and around the outer cylindrical periphery of the first shank (11), wherein the continuous thread (23 and 23a) is formed by thread rolling so as to extend additionally on and around the outer cylindrical periphery of the second shank (12), the portion extending around the second shank extending for at least one screw thread pitch and the portion extending from the zone (16) to the drill bit (21) being hardened;

characterised in that:

(i) the second shank (12) is secured to the flat surface by projection welding;

(ii) the zone (16) is a break zone (16) at which the drill screw can be broken; and

(iii) within the root of the continuous thread (23 and 23a), the first and second shanks (11 and 12) are only partially joined, at the break zone (16), and at the inner part of the shanks (11 and 12).

VI. The appellant requested revocation of the European patent in its entirety.

In support of his request he made essentially the following submissions:

- Claim 1 is based in its pre-characterising portion on the embodiment of Figures 4 and 5 of document D5. The skilled person starting from this embodiment which represents the closest prior art will with the aid of the embodiment of Figure 17 and document D8 find the way to the claimed invention without any inventive activity.

  Figure 17 of document D5 shows a rivet which is capable of being broken at the weld point (21) to permit removal of the protruding drill bit. The break zone has an annular grooved portion and thus a reduced diameter at the portion of the weld area. Therefore the embodiment of Figure 17 teaches the provision of a break zone obtained by reducing the diameter of the weld area.

- The skilled person is aware that a reduction of

diameter is not exclusively obtained by a grooved portion: Document D8 shows in Figure 12 an embodiment where the diameter of the weld zone is less than the diameter of the united rods, so that a zone of reduced diameter is also provided at the position of the weld area.

As clearly shown by document D2 there was also no prejudice against providing an annular groove or a zone of reduced diameter in a thread portion of a screw fastener.

It follows that it was obvious to provide the welding zone of the Figure 4 embodiment with a reduced diameter in order to obtain a break zone and thus to arrive at the claimed invention.

VII. The above submissions were contested by the respondent (patentee). He argued in essence that in the opposed documents there was no suggestion of the claimed feature (iii). Therefore, it was not obvious to provide a drill screw with such an arrangement.

Reasons for the Decision

1. The appeal is admissible.

2. *Article 123 EPC*

There are no formal objections under Article 123(2) to the amended claim 1 since it is adequately supported by the original disclosure.

In particular the added feature (iii) is clearly and

unequivocally shown in original Figure 5. It is true that this feature is not described literally in the description as originally filed. However, on page 8, second paragraph of the original description it is indicated that the hardening treatment is imparted to the surface layers of the drill unit and the threaded portion of the second shank. The last sentence of this paragraph explains that the break zone is not affected by the heat treatment of the surface layers because the break zone "is at an inner part of the shanks".

This also means that the weld zone is not as wide as the root diameter and is surrounded by a peripheral non-bonded zone, where the two shank ends are in surface-to-surface contact. There is thus no discrepancy in this respect between the figures and the corresponding part of the originally filed description.

It follows that the added feature (iii) is clearly and fully derivable from Figure 5 and the associated passage of the description. It should be noted in this respect that the admissibility of this amendment was no longer questioned by the appellant during the oral proceedings before the Board.

Claim 1 as at present amended which contains all the features of granted claim 1 meets also the requirements of Article 123(3) EPC.

3. *Novelty*

The Board is satisfied that the subject-matter of claim 1 is novel over the opposed documents.

Since this was never disputed during the opposition and

appeal proceedings, there is no need for further detailed substantiation of this matter.

4. *Inventive step*

4.1 It is not disputed that the drill screw shown in Figures 4 or 5 of documents D5 represents the closest prior art.

In this known drill screw of the type stated in the pre-characterising part of claim 1, the continuous thread extends from the first shank to the second shank. The first shank is welded to the second shank across the full width of the root of the continuous thread by a stored energy welding process. A drill bit is formed at the free end of the second shank.

According to the respondent's submissions, a drill screw of this kind suffers from the problem that it is not easy to detach the second shank from the first shank once the drilling action has been completed.

Therefore, the technical problem to be solved by the claimed invention is to provide the known drill screw with a structure which "enables easier and neater breaking or snapping and subsequent removal of the drill bit and superfluous threaded portion so that it does not project from a rear surface of a fastened object" (see column 2, third paragraph of the patent in suit).

4.2 This problem is in essence solved by the following features stated in the characterising part of claim 1:

(i) the second shank is secured to the flat surface

by projection welding;

(ii) the zone (where the second shank is secured to the first shank by projection welding), is a break zone at which the drill screw can be broken; and

(iii) within the root of the continuous thread the first and second shanks are only partially joined, at the break zone, and at the inner part of the shanks.

The characterising feature (iii) makes it clear that the weld zone which constitutes the break zone (characterising feature (ii)) is at an inner part between the first and second shanks within the root of the continuous thread. In the pre-characterising portion of claim 1 it is said that the first shank is made of metal unsusceptible of hardening and the second shank of metal of another kind which is susceptible of hardening. The break or weld zone is not hardened by the subsequent heat treatment of the surface layers since said zone is located at an inner part of the shanks and thus can be easily broken after the drilling action.

4.3 The provision of a predetermined break zone ("Sollbruchstelle") is envisaged in document D5 only in connection with a rivet provided with a rod which has to be broken off and removed after fastening (Figures 16 to 22). The rivet rod is secured to the drill bit by welding. The rivet sleeve that encloses the rivet rod is held stationary in relation to said rivet rod. The rivet of Figure 17 is provided with two break zones, one at the weld point, for removing the

drill bit, the other provided on the rivet rod for removing the superfluous part of the rivet rod which is protruding from the rivet sleeve (see Figures 23 and 24). As clearly shown, there is provided an annular groove at the weld zone between the rivet rod and the drill bit so that the drill bit portion can be broken off at this grooved portion.

There is thus no suggestion in the Figure 17 embodiment, that the break zone can be formed without any annular grooved portion by a weld portion located at an inner part between the rivet rod and the drill bit. Even if the skilled person had considered to apply the teaching given there to the known embodiment of Figures 4 and 5 he would not have arrived at the teaching of claim 1, since he would have provided the weld zone between the first and second shanks with a circumferential groove. In such a case the diameter of the weld portion would most probably also be equal to the root diameter at the annular grooved portion and thus the weld portion would be not protected against hardening during the subsequent heat treatment of the surface layers.

4.4 Document D8 is a very old citation (published in 1911). It deals with projection welding. In the embodiment of Figure 12, the weld zone has a diameter which may be somewhat less than the diameter of the two adjoined rods, although this is not explicitly said or shown there. However, this citation is wholly silent as to the provision of a predetermined breaking area at the weld zone. It is rather concerned with avoiding any outside bur at the joining area in order to achieve a clean and neat appearance

Accordingly, confronted with the problem underlying the patent in suit, i.e. providing easier and neater breaking and subsequent removal of the drill bit, the skilled person would not have got a suggestion as to the solution claimed in present claim 1.

4.5 A screw provided with an annular groove in the thread area is described and shown in document D2. This citation, however, discloses no weld zone, not to mention a weld zone located at an inner part of the screw, whose diameter is less than the root diameter of the screw.

4.6 In document D7, the first shank is made of not hardenable metal and the second shank of hardenable metal. After welding to the first shank, the hardenable second shank leaves an annular groove at the weld zone having a diameter equal to the defined root diameter of the screw and thus disappearing after rolling of the thread.

This citation does not envisage a break zone at the weld area. On the contrary, the weld zone which has a diameter equal to the root diameter of the annular grooved portion is hardened during the finishing heat treatment and consequently would make it extremely difficult to break the screw at such originally grooved portion.

There is thus no disclosure or suggestion in this citation of the characterising feature (iii). Therefore, even if the skilled person had considered to apply the teaching given in document D7 to the known drill screw shown in Figures 4 and 5 of document D5 he would not have arrived at the claimed teaching even

with the aid of the Figure 17 embodiment.

4.7 Therefore, in the Board's judgment the subject-matter of claim 1 involves an inventive step (Article 56 EPC).

5. Dependent claims 2 and 3 concern particular embodiments of the invention claimed in claim 1 and are likewise allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent in the following version:

- claims 1 to 3 and description filed during oral proceedings,

- drawings as granted.

The Registrar: The Chairman:

S. Fabiani F. Gumbel