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# D E C I S I O N
# of 11 April 2000

**Case Number:** T 0539/98 - 3.2.3

**Application Number:** 90914177.2

**Publication Number:** 0494196

**IPC:** E21D 9/08

**Language of the proceedings:** EN

**Title of invention:**
Tunnel drilling apparatus and method to remove drill waste

**Patentee:**
EUROBOUND IMPORT/EXPORT LIMITED

**Opponent:**
Rotex Oy

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 83, 123(2)

**Keyword:**
"Sufficiency of disclosure (yes)"

**Decisions cited:**
-

**Catchword:**
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

**Case Number:** T 0539/98 - 3.2.3

**D E C I S I O N**
**of the Technical Board of Appeal 3.2.3**
**of 11 April 2000**

**Appellant:** (Proprietor of the patent)
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**Respondent:** (Opponent)
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**Decision under appeal:** **Decision of the Opposition Division of the European Patent Office posted 28 April 1998 revoking European patent No. 0 494 196 pursuant to Article 102(1) EPC.**

**Composition of the Board:**

**Chairman:** C. T. Wilson
**Members:** J. B. F. Kollar
J. P. B. Seitz

## Summary of Facts and Submissions

I. European patent No. 0 494 196 was granted on 17 January 1996 on the basis of application No. 90 914 177.2 filed on 27 September 1990.

Granted claims 1 and 3 read as follows:

"1. A method for removal of drill waste from a drilling apparatus driving a tunnel in soil or rock by means of a working tool (4; 25) comprising a rotatable drill bit assembly (1,51; 21,51 ) and a protecting tube system (3,7; 26,28) supported by the tunnel wall and forming an annular lap joint with the drill bit assembly, the drill bit assembly comprising a drill bit (1; 21 ) and a drill bit holder (51), wherein the drill waste is forced backwards from the drill bit front through openings (2; 22) in the drill bit assembly by compressed air or water, characterized in that drill waste that has passed around the periphery of the drill bit is carried through the lap joint into the protecting tube system (3,7, 23,28), whereby access of the drill waste to the outside of the protecting tube system is prevented."

"3. An apparatus for driving a tunnel in soil or rock, comprising

a rotatable drill bit assembly (1,51; 21,51) including a drill bit (1; 21) and a drill bit holder (51) and having openings (2; 22) for removal of drill waste from the drill bit front through said drill bit assembly toward the rear end of the apparatus, and
a protecting tube system (3,7; 23,28) which is adapted to be supported by the tunnel wall and which forms

together with the periphery of the drill bit assembly (1,21; 21,51) an annular lap joint allowing longitudinal movement and rotation of the drill bit assembly relative to the protecting tube system, characterized in that the lap joint is arranged to allow drill waste to be carried through it from the periphery of the drill bit (1; 21) into the protecting tube system (3,7; 23,28) by compressed air or water."

II. An opposition was filed requesting the revocation of the patent in accordance with Article 100(a), (b) and (c) EPC.

In the course of the opposition proceedings the following documents were cited:

D1: DE-C-2 924 392

D2: Brochure "Klemm Bohrtechnik", August 1987, embodiments 14 and 15, and

D3: US-A-3 382 934.

The proprietor requested the rejection of the opposition (main request) and auxiliarily requested the maintenance of the patent in amended form according to auxiliary requests 1 and 2 filed by telefax on 5 March 1998.

III. By a decision dispatched on 28 April 1998 the Opposition Division revoked the patent for the reasons that the patent as granted and amended did not meet the requirements of Article 83 EPC. The Opposition Division held that it was not clear either from the patent as granted or amended how the invention should be carried

out in order to solve the problem of recovering the drill waste that has passed around the drill bit into the protecting tube.

IV. On 3 June 1998, the appellant (patentee) filed an appeal against the revocation and paid the appropriate fee on the same day.

The statement of grounds of appeal was received on 28 August 1998.

V. In the Annex to the summons to attend oral proceedings dated 24 September 1999, the Board set out its provisional opinion that the patent specification taken as a whole would seem to comply with the requirements of Article 83 EPC.

VI. During the oral proceedings held on 11 April 2000, after the discussion of the questions whether the patent as granted met the requirements of Articles 123(2) and 83 EPC, the parties formulated their requests as follows:

The appellant requested that the decision under appeal be set aside and the patent be maintained as granted (main request) or, subsidiarily, as amended according to auxiliary request 1 or auxiliary request 2 submitted on 5 March 1998.

The respondent (opponent) requested that the appeal be dismissed.

VII. In support of his request the appellant argued substantially as follows:

The terms "annular" (i), "lap joint" (ii) and "around" (iii) used in the patent specification as granted and questioned by the respondent in respect to the requirements of Article 123(2) EPC have a support in the documents as filed, when they are considered as a whole; said terms derive from the cylindrical shape of the drill assembly and of the protecting tube (i), their overlapping joint (ii) and the space between the periphery of the drill bit and the profile of the tunnel front (iii), respectively. There is nothing in the patent documents relating to the removal of "all" drill waste. Therefore, the requirements of Article 123(2) EPC are satisfied.

From the introductory part of the description, the description of the preferred embodiments and the drawings of the patent specification the person skilled in the art is unambiguously taught that the "lap joint" relates to the overlapping connection of the drilling assembly with the protecting tube system and that water or air, in order to be able to remove the drill waste from the tunnel front, has to possess sufficiently high pressure to evoke the suction and ejector effect in the lap joint enabling the drill waste that has passed around the periphery of the drill bit to be sucked into the protecting tube. The dimensioning of said pressure, and other features, e.g. width of the lap joint, belongs to the normal tasks of a person skilled in the art. Therefore, the patent specification satisfies the requirements of Articles 83 EPC.

VIII. In his response the respondent argued substantially as follows:

The term "annular" used in front of the word "lap

joint" in the preamble of claim 1 as granted is not disclosed in the documents as filed. Furthermore, the meaning of the term "around" in front of the word "the periphery of the drill bit" in claim 1 is not disclosed in the documents as filed, which only disclose the formulation "somehow passed the drill bit" - (see page 3, first paragraph of the application as filed). Moreover, the formulation of the characterising portion of claim 1 as granted covers excavation of "all" drill waste which has passed around the periphery of the drill bit - a circumstance which is not supported by the documents as filed. Therefore, the requirements of Article 123(2) EPC are not satisfied.

In applying the Bernoulli equation to the present case it follows that the kinetic pressure of the fluid flow inside the protecting tube system must be higher than the pressure loss of the fluid flow through the lap joint. By trying to manage for the above condition undue burden would be required from the person skilled in the art since there is no teaching in the patent specification how to proceed in order to satisfy said pressure condition. Therefore, the requirements of Article 83 EPC are not satisfied.

## Reasons for the Decision

1. The appeal is admissible.

2. *Article 123(2) EPC*

Although the term "annular" used in the preamble of claim 1 as granted was not explicitly disclosed in the documents as originally filed it is immediately clear

from said documents, when they are considered as a whole, that by driving a tunnel according to the method and apparatus described in said documents two cylindrical parts, namely a rotatable drill bit assembly and a protecting tube system are overlapping connected and cooperate with each other. In order to enable the rotation of the drill assembly relative to the protecting tube system, both said parts having a cylindrical shape, it automatically follows that the joint of said parts shows an annular shape. The technical meaning of the term "lap joint" immediately follows from the overlapping joint of said drill assembly with protecting tube system as disclosed in the document originally filed.

Although the term "around" used in the characterising portion of claim 1 as granted was not explicitly disclosed in the documents as filed it follows unambiguously from said documents that the only path of the drill waste which "somehow" was not excavated through the openings in the drill bit is the one directed to the space between the tunnel wall and the drill bit, i.e. "around" the periphery of the drill bit.

For the above reasons, the Board takes the view that the contested patent was by use of the aforementioned terms not amended in such a way that its subject-matter extends beyond the content of the application as filed. Therefore, the requirements of Article 123(2) EPC are fulfilled.

3. *Article 83 EPC*

3.1 The subject-matter of the contested patent relates to a

method for removal of drill waste from a drilling apparatus driving a tunnel in soil or rock according to the independent claim 1 and to an apparatus for driving a tunnel in soil or rock according to the independent claim 3.

It is explained in the introductory part of the patent specification (see columns 1 and 2) that the prior art methods and tunnel driving apparatus suffer from the tendency of drill waste to accumulate between the outside of the protecting tube system and the tunnel wall, especially in the lower parts of the tunnel, and to cause a wedging action between the protecting tube and the tunnel. The accumulated drill waste thus interfere with the directional control of the operation of the working tool.

The problem to be solved by the invention is thus to provide a crucial improvement of said disadvantages (see column 2, line 11 of the patent specification).

The invention is thus concerned with prevention of accumulation of the drill waste that has passed around the drill bit outside the protecting tube and solves this problem by causing that drill waste to pass into the protecting tube through a lap joint in accordance with the features of claims 1 and 3.

3.2 The decision of the first instance to revoke the patent is based on the argument that the patent specification does not disclose the invention in a manner sufficiently clear to be carried out by a person skilled in the art, since it gives no hint to any special technical features of the lap joint which would allow the lap joint to assist in the solution of the

problem posed in the patent.

3.3.1 The Board does not accept this argument for the following reasons:

The patent specification taken as a whole unambiguously teaches that the lap joint is formed by overlapping connection of the stationary protecting tube system and the rotatable drill bit assembly (see in particular the description of the preferred embodiment in columns 2 and 3 and the drawings) and moreover describes means for limiting the relative longitudinal movement of said parts forming the lap joint (see Figure 1 and the corresponding part of the description and claims 4 to 7). Furthermore, it follows from the patent specification that there are openings in the drill bit assembly which are arranged to produce an inward suction effect in the lap joint by ejector action of a fluid flow directed through the openings into the protecting tube system (see particularly Figure 1 and the corresponding part of the description and claims 2 and 8). The provision of the openings through which the soil and rock material cut away from the tunnel front by the drill bit pass rearwardly from the drill bit front into the protecting tube is known to the skilled person from the prior art document DE-A-3 514 563 referred to in the paragraph bridging columns 1 and 2 of the patent specification.

3.3.2 The Board agrees with the argument of the respondent forwarded with his submission dated 14 March 2000 alleging that among many factors the only parameter which is of great importance for the ejector effect is the flow velocity in the protecting tube system at the point where the lap joint meets the protecting tube

system and that this means, in applying the Bernoulli equation, that the kinetic pressure of the fluid flow inside the protecting tube system must be higher than the pressure loss of the fluid flow through the lap joint.

3.3.3 Contrary to the opinion of the respondent stressing that undue burden would be required from the person skilled in the art in order to provide for the aforementioned condition, the Board takes the view that adaptation of the structural and functional features as well as balancing their dimensions against the required condition by the skilled person reading the specification and following general laws of pneumatics and hydraulics, like the Bernoulli equation, belongs to normal tasks of an average engineer. The fact that there are many factors influencing the dimension of said features, like the kind of rock in which the tunnel is to be driven, the supply of pressure fluid etc, does not mean that the skilled person would be exposed to an undue burden requiring inventive activity, since the determination and operation with such factors is part of routine activities of the practitioner in this field of technology.

3.3.4 During the oral proceedings the respondent attempted to show mathematically that, on the basis of certain assumptions, (which had to be made since it was not absolutely clear what exactly would happen), the apparatus and method of the contested patent could not work. The Board was not convinced by this evidence. Firstly, such mathematical models are of necessity simplified. Secondly, a minimum critical velocity of the air or liquid must be reached in order to transport the drill waste within the protective tube, and it is

not clear to the Board that such velocity is not high enough to produce some ejector effect as required by the contested claims.

3.3.5 In view of the above, the Board concludes that the patent meets the requirements of Article 83 EPC.

4. Since the grounds of opposition according to Article 100(a) EPC had not been considered by the Opposition Division, the Board has decided not to investigate the substantive questions of patentability but to exercise its power under Article 111(1) EPC and to remit the case to the Opposition Division for further prosecution.

## 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 for further prosecution.

The Registrar: The Chairman:

A. Counillon C. T. Wilson