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Case Number : T 110 /86

19

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 24 March 1987

Appellant : (Opponent)
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Representative :
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Respondent : (Proprietor of the patent)
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Decision under appeal : **Decision of Opposition Division of the European Patent Office dated 11 February 1986 concerning maintenance of European patent No.** 0 022 373 **in amended form.**

Composition of the Board :

Chairman : P. Delbecque

Member : F. Gumbel

Member : G. D. Paterson

Summary of Facts and Submissions

I. European patent No. 0 022 373 was granted on 30 March 1983 with five claims in response to the European patent application No. 80 302 308.4 published on 14 January 1981.

II. A notice of opposition was filed by the Appellant (Opponent) on 21 December 1983 against this patent, requesting that it be revoked on the ground of non-patentability for lack of an inventive step in its subject-matter. In support of his request the Opponent relied on the documents GB-A-1 243 778 and DE-A-2 658 242. After expiry of the time limit pursuant to Article 99(1) EPC the Opponent additionally referred to US-A-3 903 955.

III. During the opposition proceedings the Respondent (Patentee) submitted a new set of claims comprising three claims and adapted the description accordingly.

IV. A communication pursuant to Rule 58(4) EPC was sent on 27 August 1985 and on 11 February 1986 the Opposition Division issued an interlocutory decision within the meaning of Article 106(3) EPC, according to which the European patent was maintained as amended, i.e. on the basis of the documents specified in the communication pursuant to Rule 58(4) EPC.

V. On 3 April 1986 the Appellant lodged an appeal against this decision together with the Statement of Grounds, requesting that the decision under appeal be set aside and that the patent be revoked. The fee for appeal was paid on 24 March 1986. Referring to the documents DE-A-2 658 242, GB-A-1 243 778 and US-A-3 903 955, he argued that the subject-matter of Claim 1 lacked an inventive step.

VI. In response to a communication accompanying the summons to oral proceedings the Respondent filed new Claims 1 to 3 and new pages 3 and 4 of the description replacing the respective documents on file.

VII. In the oral proceedings of 24 March 1987 the Appellant maintained his request, arguing that the subject-matter of new Claim 1 still did not involve an inventive step in view of the prior art represented by DE-A-2 658 242 and GB-A-1 243 778 including the general technical knowledge of a skilled person.

The Respondent requested that the appeal be dismissed and the patent be maintained on the basis of Claims 1 to 3 filed on 10 March 1987, description pages 1 and 2 filed on 28 June 1985, pages 3 and 4 filed on 10 March 1987 and column 2, line 25 onwards of the granted patent, and original Figures 1 to 3.

VIII. During the oral proceedings, the parties were informed that after having examined the late filed document US-A-3 903 955 the Board had decided to disregard this document in accordance with Article 114(2) EPC.

IX. Claim 1 reads as follows:

1. Continuous casting apparatus comprising

(a) a tundish for receiving molten metal to be cast, said tundish having an outlet opening (3a) in a side wall (1) thereof and a first nozzle (7) positioned in said opening;

(b) a continuous casting mould structure (23) arranged with its mould passage substantially horizontal and having a flange (12a) extending outwardly of the passage at its inlet end;

(c) a break ring (8) positioned at the inlet end of the mould passage;

(d) a second nozzle (9) separate from, and positioned between, said first nozzle (7) and the break ring (8); and

(e) resilient connecting means (25, 25') for urging the mould structure (23) and the tundish towards each other to engage the inlet end of the second nozzle (9) and the outlet end of the first nozzle (7) in sealing relation, said connecting means comprising a plurality of rods (15, 22a) projecting from said side wall (1) of the tundish, and carrying resilient urging means;

characterised in

(f) the provision of further connecting means (24, 24') urging the mould structure (23) and the second nozzle (9) towards each other to form a removable assembly in which the break ring (8) is in sealing relation with both the inlet end of the mould passage and the adjacent end of the second nozzle (9), said connecting means comprising a collar (10) fitted over, and bearing against, the second nozzle (9), a plurality of rods (11, 21a) projecting from the collar through respective openings in the flange (12a) on the mould structure and resilient means (14, 21) acting between said rods and the side of the flange (12a) away from the collar; and

(g) in that each rod (15, 22a) of the connecting means (25, 25') urging the mould structure (23) and the tundish together has a lever (16, 16') thereon which is slidable in the direction of the length of the rod, and rotatable about the rod, each lever (16, 16') having a portion engaging said side of said flange (12a) away from the collar (10) and resilient means (20, 22) acting between said rods and said levers.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. An examination of the available prior art documents cited by the Appellant and indicated on the front page of the patent-in-suit shows that none of them disclose a continuous casting apparatus comprising all the features set out in Claim 1. Since this never has been alleged, no detailed substantiation of this matter is required.

The subject-matter of Claim 1 is novel.

3. Regarding the question of inventive step the following is to be observed:

3.1 A continuous casting apparatus comprising the features specified in the preamble of Claim 1 is known from GB-A-1 243 778. According to this prior art apparatus the mould and the tundish are urged together by means of a plurality of threaded bolts projecting from the side wall of the tundish. A spring arranged around each bolt between the head of the bolt and a flange part of the mould provides

for a resilient connection, thus pressing the tundish, the two nozzle parts, the break ring and the mould towards each other in a sealing relation in order to prevent the ingress of air and the egress of molten material.

3.2 The problem arising with this prior art is related to the fact that, especially with those multipart constructions having two nozzles and a break ring, it has been found to be difficult to obtain sufficient pressure by means of the springs to keep all the parts in sealing relation with each other. A further problem is due to the difficulty of quickly dismantling and re-assembling the different parts in order to replace the break ring or one of the nozzle parts which are subject to excessive wear in the continuous horizontal casting technique.

3.3 According to the teaching of the patent, these problems are solved by the provision of further connecting means urging the mould structure and the second nozzle means towards each other, as specified under points (f) and (g) of the characterising portion of Claim 1. Thus, two sets of resilient connecting means are available for urging the respective parts together and ensuring a correct and complete seal between those parts. On the other hand, the mould structure, the bearing ring and the second nozzle form a removable assembly which can easily be replaced by a previously mounted assembly in case of wear.

3.4 As pointed out by the Appellant and admitted by the Respondent, the basic idea of employing separate connecting means for urging a nozzle into engagement with the inlet end of a horizontally arranged continuous casting mould in order to form a removable assembly readily connectable to the tundish, is known from DE-A-2 658 242. Furthermore, according to the embodiment of Fig. 4 of this document if applied to the general structure shown in Fig. 2, there are

disclosed the features that those further connecting means comprise a collar fitted over and bearing against the nozzle and also that there is a plurality of rods projecting from the collar and carrying resilient urging means (hydraulic piston-cylinder 22) which act between said rods and a part of the mould structure, largely in accordance with the features under point (f) of present Claim 1.

3.5 However, the prior art according to DE-A-2 658 242 is not related to a nozzle construction comprising two outlet nozzles, and also does not show a separate break ring arranged between the mould structure and the nozzles, but rather concerns a one-piece nozzle without a break ring. The opinion expressed by the Appellant in his Statement of Grounds and also in the oral proceedings, according to which an expert would automatically understand from the disclosure of this document that the drawings are of a merely schematic nature and that in reality this document deals with a nozzle construction consisting of several parts and a separate break ring, as usual, is not shared by the Board. The Board considers that both the drawings and the description of this prior art document are of a fairly detailed character as far as the nozzle construction is concerned, and therefore do not leave much room for interpretation to the skilled person. On the other hand, the Appellant did not furnish any proof in support of his allegation that in practice one-piece nozzles without a separate break ring did not exist. Some documents submitted in this context during the oral proceedings merely show that nozzles consisting of several parts and a separate break ring were usual in the technique of horizontal continuous metal casting; however, they do not prove that one-piece nozzles did not exist and would never have been taken into consideration by a skilled person looking at DE-A-2 658 242.

3.6 As set out under point 3.2 above, the specific problems underlying the invention are closely related to a nozzle construction comprising more than one nozzle and having, in addition, a separate break ring. Hence, it appears to be doubtful whether a skilled person trying to find a solution to these problems would consider a prior art document relating to a type of continuous casting apparatus where those problems do not exist, or at least do not exist to the same extent. Consequently, it is doubtful whether in the present case a skilled man would take any suggestion from DE-A-2 658 242.

3.7 Even if he did so, he would not arrive at the solution as specified in the characterising portion of Claim 1 for the following reasons:

3.8 Contrary to what is disclosed in DE-A-2 658 242, he then first had to decide to position the first connection means urging the tundish and the mould-nozzle-assembly towards each other on the same side as the second connecting means, thereby replacing the resilient pushing means by pulling means. Whilst this latter feature certainly comes within the scope of technical knowledge of a skilled man, the general idea of arranging two sets of connecting means on the same side of the tundish has no lead in the available prior art and, in the absence of any evidence furnished by the Appellant, cannot be considered as forming part of the general technical knowledge.

3.9 A further step to take on the way to the invention as specified in Claim 1 relates to the idea of using a flange at the inlet end of the mould structure, as a common anchoring plate for both the first and second connecting means. Again, there is no lead towards this idea in any of the available documents. The argument presented by the

Appellant, according to which this feature was absolutely obvious to the skilled person, since it never would arrange additional anchoring means, such as a second flange, at the end of the mould for economical reasons, appears to be merely speculative and of a hindsight nature. Regarding the disclosure of DE-A-2 658 242, it would have been obvious rather to arrange the two connecting means separately from one another and to position a separate rigid support means similar to post 12 shown in Fig. 2 of this document on the mould side of the tundish, provided that the idea of re-positioning the first connecting means to this side had been conceived.

3.10 Finally, in order to arrive at the subject-matter of Claim 1, additional features had to be designed concerning the construction of the first connecting means in a manner ensuring an easy and quick replacement of the mould-nozzle-assembly. These features are set out under point (g) of Claim 1, and comprise the use of a slidable and rotatable lever which is easily engageable with the common anchoring flange of the mould. Again, there is nothing in the available documents rendering these features obvious, and the Appellant did not furnish any evidence in support of his opinion according to which those features are trivial for the man skilled in the art.

3.11 As follows from the foregoing, the combination of the teachings of the two documents relied upon by the Appellant, namely DE-A-2 658 242 and GB-A-1 243 778, would not lead to the specific apparatus specified in Claim 1.

3.12 The other documents cited on the front page of the patent specification in suit are even further away.

3.13 To arrive at this apparatus a number of additional steps had to be made which were without direct lead in the available prior art and which in the absence of any proof to the contrary cannot be considered as coming within the scope of general technical knowledge of the skilled man. The Board, therefore, takes the view that the combination of features indicated in the characterising position of Claim 1 is not obvious to a person skilled in the art having regard to the available state of the art and, consequently, the subject-matter of Claim 1 is considered as involving an inventive step pursuant to Article 56 EPC.

4. Claim 1 must, therefore, be maintained.

5. Claims 2 and 3 concern particular embodiments of the apparatus according to Claim 1 within the meaning of Rule 29(3) EPC and thus can also be upheld.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

2. The case is remitted to the first instance with the order to maintain the European patent on the basis of the following documents:

   Claims 1 to 3 received on 10 March 1987,
   description pages 1 and 2 received on 28 June 1985,
   pages 3 and 4 received on 10 March 1987
   and column 2, line 25 onwards of the granted patent,
   Figures 1 to 3 of the granted patent.

The Registrar | The Chairman

B.A. Norman | P. Delbecque