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Datasheet for the decision of 20 July 2010

Case Number: T 1743/08 - 3.2.05

Application Number: 02079668.6

Publication Number: 1318002

IPC: B29C 33/38

Language of the proceedings: EN

Title of invention:
Forming apparatus using inductive heating, comprising a ceramic die with a durable coating

Patentee:
The Boeing Company

Opponents:
AIRBUS Deutschland GmbH/AIRBUS France SAS/AIRBUS UK Limited/AIRBUS España S.L./AIRBUS SAS

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), 56, 112(1)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Amendments (allowable)"
"Inventive step (yes)"
"Referral to the Enlarged Board of Appeal (no)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1743/08 - 3.2.05

D E C I S I O N
of the Technical Board of Appeal 3.2.05
of 20 July 2010

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 10 July 2008 revoking European patent No. 1318002 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman: W. Zellhuber
Members: P. Michel
M. J. Vogel

Summary of Facts and Submissions

I. The appellant (patent proprietor) lodged an appeal against the decision of the Opposition Division revoking European Patent No. 1 318 002 on the grounds of extension of subject-matter under Article 123(2) EPC and lack of novelty and inventive step.

II. Oral proceedings were held before the Board of Appeal on 20 July 2010.

The appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of

- claims 1 - 11, as filed as main request during the oral proceedings,

- description page 2 as granted, pages 3 - 5, as filed during the oral proceedings

- drawings, pages 9 - 13, as granted.

The respondents (opponents) requested that the appeal be dismissed, additionally, they request that the three questions cited in their submission received on 19 July 2010 be referred to the Enlarged Board of Appeal.

III. Claim 1 of the sole request of the appellant reads as follows:

"1. A combination of a die (20’,22’) and susceptor sheet (100) for use in a forming apparatus (8) that uses inductive heating, the die comprising:

- a die body (54) having a cast portion that is formed from a first material that is not susceptible to inductive heating; and
- a plurality of induction coil segments (72) imbedded in the die body, characterised in that
- a die liner (56') coupled to the die body, the liner defining a die cavity (82) and a forming surface (60), wherein the liner (56') is formed from a ceramic material that is not susceptible to inductive heating and the liner is a ceramic composite that has been sintered, said ceramic composite being different from the first material having at least one characteristic such as material strength and/or chemical resistance different than the corresponding characteristic of the first material, achieving a more durable material than the cast portion of the die body so as to permit extended use of the die, wherein the liner (56) has a thickness of between about 2.0 mm and about 3.2 mm, and wherein the liner (56') has an enlarged forming surface (60') to accommodate the presence of the susceptor sheet (100) having a Curie temperature for maximum temperature control."

IV. The following documents are referred to in the present decision:

O1: US-A-6,322,645
O3: US-A-5,683,608
O4: EP-A-0 335 100
O11: US-A-5,728,309
O12: US-A-5,645,744

V. The appellant argued substantially as follows in the written and oral procedure:

The combination of a die and susceptor sheet as claimed in claim 1 is disclosed in the application as filed, so that the requirement of Article 123(2) EPC is complied with.

Document O3 is the closest prior art, relating to a combination of a die and susceptor sheet for use in a forming apparatus using inductive heating.

The problem to be solved is set out in the patent in suit at column 3, lines 15 to 25, that is, to improve the durability of the die and its compatibility with the susceptor. According to the invention, this problem is solved by providing a liner as specified in claim 1, which can deal with temperature changes.

Documents O11 and O12 teach away from this solution in that they propose reinforcing the inserts.

Document O4 is not primarily concerned with inductive heating and thus does not relate to the same technical field. The object of the invention of document O4 is to reduce cycle times (column 2, lines 42 to 45) and is concerned with the smoothness of the skin layer in order to permit the material of the workpiece to flow along the skin layer during compression moulding. The problems solved by the present invention are thus not addressed. There is thus no incentive to combine documents O3 and O4. Even if these documents were to be combined, this would not result in a die having the features of claim 1. Document O4 is largely concerned

with a metal skin layer and there is no reason to select a sintered ceramic layer having the thickness specified in claim 1, column 8, lines 17 to 20 referring to a metal layer. Further, at column 5, lines 32 to 35, it is suggested that the surface layer of the mould can be preheated by induction, so that, for this purpose, the material of the skin layer must be susceptible to inductive heating.

Document O1 is not intended for use with a susceptor sheet. In particular, the shape of the mould is unsuitable for use with a susceptor sheet. The document thus does not deal with the problem of compatibility of the liner therewith. Further, a susceptor sheet has the effect of evenly distributing heat. In contrast, the mould of document O1 achieves an uneven distribution of heat. In addition, document O1 teaches the provision of a thick layer. It is also noted that, according to column 3, lines 2 to 8, of document O1, the forming process of document O1 is unrelated to the Boeing process.

The subject-matter of claim 1 thus involves an inventive step.

VI. The respondent argued substantially as follows in the written and oral procedure:

The amendments to claim 1 are not allowable in view of Article 123(2) EPC. In particular, the only disclosure of susceptor sheets in the application as filed is in paragraph [0036], where it is specified that the susceptor sheets are disposed between the workpiece and the dies.

The subject-matter of claim 1 lacks an inventive step. The closest prior art document may be variously regarded as being documents O12, O1 or O3, all of which relate to dies utilising susceptor sheets. In general, the person skilled in the art would consider providing some form of protective liner, for example, those disclosed in document O1 and O4, in order to solve mechanical problems of cracking or chemical problems of incompatibility.

Document O12 discloses at column 3, lines 17 to 23, that the ceramic tooling is strengthened and reinforced internally and externally. The external reinforcing refers to the presence of a liner as specified in claim 1 of the patent in suit. In view of the disclosure of document O1, it does not involve an inventive step to provide a liner of the material specified in claim 1 and having the characteristics specified in claim 1 in the apparatus of document O12.

Alternatively, document O1 may be regarded as being the closest prior art. This document refers at column 5, lines 33 to 35 to a thin walled shell. Documents O11, O12 and O3 make it obvious to use a liner having a thickness of 2.0 to 3.2 mm.

In a further alternative approach, document O3 is regarded as being the closest prior art. Claim 1 is distinguished over the disclosure of this document solely by the provision of a liner. Document O4 teaches that the liner must be hard. The same mechanical problems arise in inductive heating or transfer heating. The choice of the liner thickness as specified in

claim 1 does not solve a technical problem and is not significant, in particular since the material and thermal conductivity of the liner is not specified.

The subject-matter of claim 1 thus does not involve an inventive step, in particular since there is no evidence of any advantages arising from the combination of features of claim 1.

The following questions should be submitted to the Enlarged Board of Appeal:

1. In the case of amendments to the claims, is the Opposition Division entitled and obliged to examine whether the restricted claims comply with all requirements of the EPC, in particular the requirements of Article 84 EPC?

2. If question 1 is answered in the negative, what are the criteria for an examination of the claims in respect of the requirements of Article 101(3)(a) EPC?

3. Is there an exception in the case of a pure combination of granted claims?

Reasons for the Decision

1. Admissibility of the amended request

In the decision under appeal, it was held by the Opposition Division that the susceptor sheet formed part of the claimed die (see point 4). It was only at

the oral proceedings before the Board that doubt was cast on this aspect of the decision. In response, the appellant amended the claims so as to relate explicitly to the combination of a die and a susceptor sheet.

The amended claim is thus construed as having the scope attributed by the Opposition Division to the unamended claim.

Accordingly, the Board is of the opinion that it was equitable to allow the claims to be amended so as to refer explicitly to the combination of a die and a susceptor sheet.

The amended request is accordingly admitted into the proceedings.

2. Amendments

Claim 1 has been amended as compared with claim 1 as granted so as to relate to a combination of a die and a susceptor sheet as opposed to a die *per se*. In paragraph [0036] of the application as filed (published version), it is stated that, instead of the die liner forming the outer mould line of a workpiece, the die liner may be configured for use with susceptor sheets. This is illustrated in Figure 7, which shows a partial section of a die. The skilled reader of this document will appreciate that the remainder of the die, not shown in Figure 7, is the same as that illustrated in Figures 1 to 6 and described in paragraphs [0022] to [0035].

Claim 1 specifies that the liner has an enlarged forming surface to accommodate the presence of the susceptor sheet. The location of the susceptor sheet is thus specified.

The application as filed thus discloses a combination of a die and a susceptor sheet as claimed in claim 1.

In addition, the preferred feature claimed in claim 3, that is, the die body being cast onto the die liner, disclosed at column 6, lines 3 to 5, of the application as filed, is also disclosed in combination with a combination of the die with a susceptor sheet.

The amendments thus comply with the requirements of Article 123(2) EPC.

3. Inventive Step

3.1 Closest prior art

It was suggested on behalf of the respondent that either of documents O11 and O12 should be regarded as constituting the closest prior art, in particular in view of the passage at column 3, lines 17 to 23 of each document. Insofar as this passage refers to external reinforcement of the die body, there is disclosed reinforcement with "metal or other durable strongbacks". This passage is thus not concerned with providing any from of reinforcement on the forming surface of the die body, but rather with the structure which supports the side of the die body remote from the forming surface. These documents are thus no more relevant to the subject-matter of claim 1 than document O3.

It was further suggested that document O1 should be regarded as the closest prior art. However, this document is not concerned with a combination of a die and a susceptor sheet. The disclosure of document O1 is rather concerned with forming a tubular metal blank which itself is inductively heated, the heating being localized along the length of the blank (see column 3, lines 52 to 56). In contrast, the presence of a susceptor sheet tends to distribute the heat more evenly over the surface of the workpiece.

The closest prior art is thus represented by document O3. This document discloses a combination of a die and a susceptor sheet for use in a forming apparatus that uses inductive heating, the die comprising a die body having a cast portion that is formed from a first material, and a plurality of induction coil segments imbedded in the die body, the die body having an enlarged forming surface to accommodate the presence of the susceptor sheet.

The subject-matter of claim 1 is distinguished from the disclosure of document O3 at least in that there is provided a die liner coupled to the die body, wherein the liner is formed from a ceramic material not susceptible to inductive heating and the liner is a ceramic composite that has been sintered, the ceramic composite being different from the first material having at least one characteristic such as material strength and/or chemical resistance different than the corresponding characteristic of the first material, achieving a more durable material than the cast portion of the die body so as to permit extended use of the die,

the liner having a thickness of between about 2.0 mm and about 3.2 mm, and an enlarged forming surface to accommodate the presence of the susceptor sheet having a Curie temperature for maximum temperature control.

3.2 Problem to be solved

As stated in the patent in suit in paragraph [0010], the prior art suffers from problems of degradation of the forming surface of the die caused by cracking, resulting from cyclical stresses, and/or failing as a result of chemical incompatibilities with the susceptors at elevated temperature.

The problem to be solved is thus to increase the durability of the die.

3.3 Solution

According to claim 1 of the patent in suit, this problem is solved, in particular, by the provision of a die liner coupled to the die body, wherein the liner is formed from a ceramic composite that has been sintered, the liner having a thickness of between about 2.0 mm and about 3.2 mm.

Document O1 relates to a method of forming a tubular sheet metal blank in which the blank is inductively heated. A die set is disclosed having a shell which contacts the workpiece, which is made of a high hardness ceramic material. In a preferred embodiment, the shell has a thickness of 3/8 to 5/8 inches (0.95 to 1.58 cm) and is cast from silicon nitride with or without sintering (see column 5, lines 21 to 27). As

illustrated in Figure 15, the inductive heating elements are arranged so that selected portions of the axial length of the blank are heated.

Document O1 is not concerned with the problems as set out under point 2.2 above. There is no reference to the problems associated with cyclical stresses of the ceramic shell, and the sheet metal blank does not require the presence of a susceptor sheet.

Document O1 thus does not provide any incentive for the person skilled in the art to modify the die of document O3 by providing, in combination with a susceptor sheet, a liner which is a ceramic composite that has been sintered, and having a thickness of between about 2.0 mm and about 3.2 mm.

Document O4 relates to a mould for compression moulding of preheated thermoplastic workpieces. Each mould half is covered with a layer of thermally insulating material for retaining the heat in the preheated workpiece and a hard skin layer of metal or ceramic, which may be applied by sintering (column 4, lines 18 to 40).

Document O4 is concerned with the problems of obtaining a smooth surface on the moulded thermoplastic workpieces (see column 1, lines 21 to 28). It is particularly concerned with the problems which arise from contact between the workpieces and the skin layer, as well as enabling short cycle times, as discussed at column 1, line 42 to column 2, line 45.

However, when susceptor sheets are used in inductive heating, there is no contact between the mould surface and the workpiece. There is further no suggestion in document O4 of a solution to problems which may arise either from cyclical stresses of the skin layer, or as a result of chemical incompatibility between the skin layer and the workpiece. Document O4 thus does not offer a solution to the problems solved according to the patent in suit.

Whilst documents O11 and O 12 suggest the use of susceptor sheets having a Curie temperature for maximum temperature control, these documents do not suggest the provision of a die liner as specified in claim 1.

3.4 The subject-matter of claim 1 thus involves an inventive step. Claims 2 to 11 are directly or indirectly dependant from claim 1 and relate to preferred features of the combination. The subject-matter of these claims thus similarly involves an inventive step.

4. Referral to the Enlarged Board of Appeal

According to Article 112(1) EPC, a referral to the Enlarged Board of Appeal is appropriate if this appears necessary for ensuring uniform application of the law, or if an important point of law arises.

In the present case, the request for referral was directed to claim 1 of an auxiliary request I filed on 19 May 2008. That request was withdrawn during the oral proceedings, which renders a referral obsolete. In addition, claim 1 of that request represents a

combination of claims 1, 6, 13 and 14 as granted, the dependency of each of these claims including the preceding of these claims. The features of that claim 1 were thus, in effect, present in combination in the set of claims as granted, and no amendment has been made which would require examination of objections arising out of Article 84 EPC.

The Board is of the opinion that the examination of an amended claim resulting from a combination of claims as granted in opposition proceedings should be restricted to objections which form grounds for opposition under Article 100 EPC. As far as the Board is aware, there is no contradictory case law which would suggest that a referral to the Enlarged Board of Appeal could be appropriate.

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 on the basis of the following documents:

claims: 1 - 11, filed as main request during the oral proceedings,

description: page 2 as granted,
pages 3 - 5, filed during the oral proceedings,

drawings: pages 9 - 13, as granted.

The Registrar: The Chairman:

D. Meyfarth W. Zellhuber