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**Datasheet for the decision  
of 12 February 2020**

**Case Number:** T 0016/17 - 3.2.03

**Application Number:** 08019768.4

**Publication Number:** 2060863

**IPC:** F26B21/00, F26B3/28, F26B15/12

**Language of the proceedings:** EN

**Title of invention:**  
Coating film drying method and coating film drying apparatus

**Patent Proprietor:**  
Mazda Motor Corporation  
Taikisha, Ltd.

**Opponent:**  
Dürr Systems GmbH

**Headword:**

**Relevant legal provisions:**  
EPC Art. 100 (c), 100 (b), 123 (2), 83, 56

**Keyword:**

Grounds for opposition - subject-matter extends beyond content  
of earlier application (no) - insufficiency of disclosure (no)  
Amendments - extension beyond the content of the application  
as filed (no)  
Sufficiency of disclosure - (yes)  
Inventive step - main request (yes)

**Decisions cited:**

G 0003/14

**Catchword:**



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

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Case Number: T 0016/17 - 3.2.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.03**  
**of 12 February 2020**

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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
14 October 2016 concerning maintenance of the  
European Patent No. 2060863 in amended form.**

**Composition of the Board:**

**Chairman**            C. Donnelly  
**Members:**            R. Baltanás y Jorge  
                              D. Prietzel-Funk

## **Summary of Facts and Submissions**

- I. The appeal lies from the decision of the opposition division to maintain European patent No. 2 060 863 in amended form.
- II. The opponent (hereinafter: the "appellant") filed an appeal against this decision.
- III. In support of its case the appellant relied on the following documents which were cited, both in the grounds of appeal and during the opposition proceedings:
- E1: US 2004/0043156 A1  
E3: DE 3515600 C1  
E6: US 2660723 A  
E12: "BASF-Handbuch Lackiertechnik", Vincentz Verlag, 2002
- IV. In a communication dated 24 July 2019, pursuant to Article 15(1) of the Rules of procedure of the Boards of Appeal (RPBA) (2007), annexed to the summons to oral proceedings, the Board informed the parties of its provisional opinion.
- V. In response to the Board's communication, the patent proprietor (hereinafter: the "respondent") submitted by letter of 7 January 2020, auxiliary requests 1 and 2.
- VI. Oral proceedings were held on 12 February 2020. At the end of the debate the parties confirmed the following requests:

The appellant requested that the decision under appeal be set aside and the patent be revoked.

The respondent requested that the appeal be dismissed or that the patent be maintained in amended form on the basis of the claims of auxiliary requests 1 or 2 submitted with the letter dated 7 January 2020.

VII. Method claim 1 as maintained by the opposition division, including the numbering of its features as adopted by the parties, reads as follows:

- 1**            *A method for drying a coating film (4a)*
- 1.1**          *on an exterior panel of a box-shaped workpiece (4), comprising*
- 1.2**          *supplying radiant rays from an infrared heater,*
- 1.3**          *and warm air having a temperature in the range of 40 to 100° C*
- 1.3.1**        *which is less than a hardening temperature of said coating film (4a),*
- 1.2**          *simultaneously and directly to said coating film (4a),*
- 1.4**          *wherein said radiant rays and said warm air are supplied to said coating film (4a) on said exterior panel of said workpiece (4), in an upstream area of a drying line;*
- 1.5**          *cooling air having a temperature set in the range of 20 to 45° C to be less than that of said warm air in said upstream area of said drying line is supplied to said coating film (4a) on said exterior panel of said workpiece (4), in a downstream area of said drying line*

*on a downstream side relative to said upstream area, and*

- 1.6** *wherein a flow volume of said cooling air in said downstream area of said drying line is set to be equal to or greater than that of said warm air in said upstream area of said drying line, and wherein*
- 1.7** *at least a specific one of a plurality of streams of said warm air is directed in a direction causing collision to said infrared heater for generating said radiant rays,*
- 1.8** *wherein, during absence of said workpiece (4), at least one of the remaining streams of said warm air is merged with said specific stream of said warm air to change a direction of said specific stream of said warm air*
- 1.8.1** *to prevent the infrared heater from being positively cooled by the warm air,*
- 1.9** *wherein the method is used in a process of preheating said coating film (4a) on said exterior panel of said workpiece (4),*
- 1.9.1** *wherein said coating film (4a) is a coating film of a water-based paint,*
- 1.10** *wherein said workpiece (4) has an opening which provides fluid communication between an outside and an inside thereof,*
- 1.10.1** *and includes an inner panel having thereon a coating film (4b) to be dried,*
- 1.10.2** *wherein said warm air is supplied to said coating film (4b) on said inner panel of said workpiece (4) from the outside of said workpiece (4) through said opening,*
- 1.11** *and wherein said radiant rays and said warm air are supplied to said coating film (4a) on said exterior panel of said workpiece (4)*

*while moving said workpiece (4) along the drying line,*

- 1.11.1** *and wherein an output level of said radiant rays is maximized at an upstreammost position of said drying line, and gradually reduced toward a down stream side of said drying line.*

VIII. Apparatus claim 3 as maintained by the opposition division, including the numbering of its features as adopted by the parties, reads as follows:

- 3** *An apparatus for drying a coating film (4a)*
- 3.1** *on an exterior panel of a box shaped workpiece (4), comprising:*
- 3.2** *an infrared heater (11) adapted to emit infrared rays to said coating film (4a);*
- 3.3** *a warm-air blow port (12 to 14) adapted to blow warm air having a temperature in the range of 40 to 100° C*
- 3.3.1** *which is less than a hardening temperature of said coating film (4a), directly to said coating film (4a),*
- 3.3.2** *in concurrence with the emission of infrared rays from said infrared heater (11);*
- 3.4** *a drying furnace (2) adapted to allow said workpiece (4) to pass therethrough, said drying furnace (2) having*
- 3.4.1** *a heating zone (Sh) where heating means comprising said infrared heater (11) and said warm-air blow port (12 to 14) is disposed on an inner surface of said drying furnace (2) and arranged in a direction from an upstream side to a downstream side of said drying furnace (2),*



- 3.4.2** *and a cooling zone (Sc) subsequent to said heating zone (Sh);*
- 3.5** *and a cooling-air blow port (12' to 15') opened in a portion of the inner surface of said drying furnace (2) corresponding to said cooling zone (Sc), said cooling-air blow port (12' to 15') adapted to blow cooling air having a temperature set in the range of 20 to 45° C to be less than that of said warm air,*
- 3.6** *wherein said apparatus is configured such that a flow volume of said cooling air from said cooling-air blow port (12' to 15') in said cooling zone (Sc) is set to be greater than that of said warm air from said warm-air blow port (12 to 14) in the heating zone (Sh),*
- 3.7** *said apparatus includes a plurality of the infrared heaters (11) and a plurality of the warm-air blow ports (12 to 14),*
- 3.7.1** *wherein at least a specific one of said plurality of warm-air blow ports (12 to 14) is disposed in opposed relation to a part of said plurality of infrared heaters (11) to blow warm air causing collision with said part of said plurality of infrared heaters (11),*
- 3.7.2** *and at least one of the remaining warm-air blow ports is disposed to blow said warm air in a direction crossing a direction toward which said specific warm-air blow port is oriented*
- 3.7.3** *to prevent the infrared heater from being positively cooled by the warm air,*

- 3.8 *said apparatus is used in a process of preheating said coating film (4a) on said exterior panel of said workpiece (4),*
- 3.8.1 *wherein said coating film (4a) is a coating film of a water-based paint,*
- 3.9 *wherein said warm-air blowing port (12 to 14) includes at least one warm-air blowing port adapted to supply said warm air to a coating film (4b) on an inner panel of said workpiece (4) from the outside of said workpiece (4) through an opening in said workpiece (4),*
- 3.9.1 *said opening providing fluid communication between an outside and an inside of the workpiece (4),*
- 3.10 *and wherein said infrared heater (11) is configured such that an output level of said infrared heater (11) is set in such a manner as to be maximized at an upstreammost position of said drying furnace (2), and gradually reduced toward the downstream side of said drying furnace (2).*

IX. The appellant's arguments can be summarised as follows.

Added subject-matter, Article 123(2) EPC

(a) Features 1.3, 1.5, 3.3 and 3.5

The basis for these features is supposed to be the originally filed description page 6, lines 24 to 28. However, this passage not only discloses the temperature ranges, but also flow volume and moisture content of the air. The omission of these features in the independent claims constitutes an unallowable intermediate generalisation, since there is an inextricable link between the missing features and the

claimed temperature range which is necessary for determining the calorific power of the air stream and its ability to dry a water-based paint. The relevance of the calorific power for the invention, both for warming the car body of the particular embodiment and for cooling it down, was originally disclosed in the last ten lines of page 7, in the second paragraph of page 8, in the data of the tables corresponding to figures 7A and 7B, and in originally filed claim 2 (where a particular heating rate was specified).

(b) Features 1.7, 1.8, 1.8.1, 3.7.1, 3.7.2 and 3.7.3

The original disclosure concerns the protection of the infrared (IR) heaters from the collision with air streams (see originally filed description page 6, lines 19 to 24, and page 17, lines 8 to 10). However, the original disclosure also teaches that the IR heaters must be exposed to the air streams in order to suppress overheating (see page 5, lines 10 to 12). Since both functions are mutually exclusive, there is no original disclosure about performing the invention with these functions in combination as claimed.

According to features 1.6, 3.6, the air flow volume of the cooling zone is equal or greater than the air flow volume of the heating zone, thus no air flow can take place from the heating zone along the tunnel, and consequently a constant turbulence would occur at that zone which would positively cool the IR heaters. Feature 1.8.1, 3.7.3 is therefore not originally disclosed in combination with the rest of the features of claim 1.

Furthermore, the disclosed embodiment from which the concerned features have been extracted is limited to IR

heaters with a total intensity ranging from 10 to 75 KW (see page 5, lines 15 to 17). However, this limitation is not specified in the independent claims.

Finally, the added features were only originally disclosed in connection with a specific arrangement of the streams causing collision with the IR emitters (namely, air streams originating from particular lateral positions; see originally filed figure 2) and, the streams which are merged with the previous ones (namely, air streams originating from the upper side of the tunnel; see originally filed figure 2). However, claims 1 and 3 are directed to any air streams arranged in whatever direction.

Insufficiency of disclosure, Article 83 EPC

The claims define an open range over which the invention must be achievable. However, this is not the case since combinations of warm air temperatures of 40°C to 60°C and very low air flow volumes are included in the claimed ranges which could not provide the necessary drying effect of the invention. This is particularly evident when consulting the tables of figures 7A and 7B.

Furthermore, the drying of a water-based paint is also dependent on a number of factors which are not defined in the claims, such as the amount of heat to be transferred.

The contradiction between avoiding positive cooling of the IR heaters by the warm air streams whilst simultaneously ensuring that they are cooled by the same air streams is also an unsurmountable obstacle for the skilled person trying to reproduce the invention.

Finally, not all water-based paints have a hardening temperature, since not all of them harden, which makes it impossible for the skilled person to implement features 1.3, 1.3.1, 3.3 and 3.3.1 for all water-based paints. This is particularly problematic in connection with claim 3, since feature 3.8.1 (wherein said coating film is a coating film of a water-based paint) cannot be considered as a feature of the device claim 3, which merely encompasses the apparatus for drying a coating film, but not the coating film itself.

In conclusion, the independent claims are just an invitation for the skilled person to carry out a research program in order to find out all the necessary parameters to obtain the desired effect of drying a coating film within a relatively short period of time without causing a negative effect on a surface quality of the coating film (see paragraph [0005] of the patent specification).

Inventive step, Article 56 EPC

The subject-matter of claims 1 and 6 does not involve an inventive step in view of E3 combined with the common general knowledge of the skilled person, or E6.

Features 1.7 and 3.7.1 are disclosed in the figure of E3 and the passage at column 3, lines 5 to 7, which show that at least one of the warm air streams must necessarily be directed towards one of the infrared heaters.

Features 1.8 and 3.7.2 are also disclosed by E3, because the warm air streams flowing from the ceiling of the apparatus must deflect the side air streams in the same way as in the contested patent due to their

relative location. Since the warm air streams are deflected, it must be concluded that positive cooling is prevented and that features 1.8.1 and 3.7.3 are thus disclosed.

The objective technical problem associated with the device is the optimisation of a drying tunnel for a specific workpiece and coating (see contested patent, column 6, lines 11 to 16).

It can be deduced from the figure of E3 and from lines 33 and 34 of column 3 of the description, that the number of air nozzles per unit area in the cooling zone 3 is double that in the heating zone 2. This alone is a hint towards providing a higher air flow volume in the cooling area. Moreover, there are only three possible options open to the skilled person, namely that the air flow volume of the cooling area 3 is higher, equal to or lower than the air flow volume of the heating area 2. Two of these options fall within the claimed scope of features 1.6, 3.6.

Finally, the skilled person is aware that warm air entering the cooling area diminishes the energy efficiency of the cooling process, and would thus provide an air flow volume in the cooling area which is equal to or higher than that of the heating area in order to prevent this disadvantageous air circulation.

Concerning features 1.11.1 and 3.10, claim 5 of E3 discloses that the IR heaters 5 are adjustable in their intensity. Since it is well-known that the cold car body must be provided with more heat at the beginning of a drying tunnel, the skilled person would adjust the intensity of the IR heaters as specified by the differentiating features in order to optimise the amount of energy spent in the drying process. They

would do so because E3 contains a hint to adjust the amount of heat provided by the warm air along the tunnel (column 3, lines 15 to 21), so they would understand that IR heaters should be adjusted in the same way for the same purpose.

Alternatively, document E6 discloses feature 1.11.1 in a comparable technical field, thus the skilled person would learn this teaching when consulting E6 and would apply it in the tunnel of E3.

IX. The respondent's arguments can be summarised as follows.

Added subject-matter, Article 123(2) EPC

(a) Features 1.3, 1.5, 3.3 and 3.5

Originally filed claim 1 focused on the fact that warm air temperature had to be less than a hardening temperature of the coating film. Thus, the skilled person would have immediately understood that the core of the invention concerned this fact. The last seven lines of originally filed page 7 provide an example of such warm air temperature being less than the hardening temperature of a coating film. Since the cooling air temperature is defined as a function of the warm air temperature, the same reasoning applies.

There is no inextricable relationship between the warm air temperature and the flow rate or humidity of the air since the heating rate is also dependent on other parameters such as the structure of the box-shaped workpiece and the size of the tunnel, and the skilled person would understand that this is a different issue from the one addressed by originally filed claim 1.

(b) Features 1.7, 1.8, 1.8.1, 3.7.1, 3.7.2 and 3.7.3

No contradiction can be observed between avoiding positive cooling of the IR heaters by the warm air and the cooling provided by the air stream in the tunnel, since the skilled person understands that positive cooling is the one provided by an air stream directed towards the IR heater and thus flowing at a much higher speed than the air stream flowing along a tunnel. Features 1.6, 3.6 do not prevent air circulation along the tunnel, but only in the direction from the heating zone towards the cooling zone. Air circulation along the tunnel will occur since an air exit must exist at some point of the tunnel. The invention simply prevents the positive cooling caused by a particular air stream, which is independent of the fact that the IR heaters will be cooled by the air flow circulating along the tunnel.

The feature of merging warm air streams to change a direction of a specific stream of warm air is disclosed in claim 6 as originally filed. Therefore, the skilled person, would understand that the arrangement of nozzles disclosed at lines 16 to 20 of the description as filed relates to a particular embodiment, but is not limiting.

Insufficiency of disclosure, Article 83 EPC

The skilled person in the technical field of drying tunnels knows how to operate such devices, and they would have no problem in interpreting and implementing the features of the claims.



The tables of figures 7A and 7B of the patent specification merely show the influence of different configurations on the end result. The skilled person is fully aware of how different configurations can be achieved and would consequently adjust all necessary parameters when implementing the invention.

The hardening temperature of a coating is a known parameter for the skilled person (see E1, paragraphs [0047] and [0056], and E12, page 750). Features 1.3.1 and 3.8.1 imply that the coating film must be one having a hardening temperature.

With regard to feature 3.8.1, the water-based paint is not meant to be the distinguishing feature of the invention, and even if this could be considered as unclear, lack of clarity is not an issue when contesting granted claims (note: the feature was claimed in granted claim 8 and see G3/14).

Inventive step, Article 56 EPC

A direct and unambiguous teaching of feature 1.6, 3.6 cannot be found in E3, since the number of nozzles disclosed in the figure at the cooling zone does not necessarily imply a higher air-flow rate.

The arguments of the appellant concerning obviousness of features 1.6, 3.6 departing from E3 in combination with common general knowledge rely on an ex-post facto analysis, since the reasoning which the skilled person would have to apply corresponds precisely to that which is taught in the patent. However, no document shows that this constitutes common general knowledge.

The sole figure of E3 is schematic and it is not possible to draw any conclusions concerning the orientation or even the presence of nozzles either on the ceiling of the drying tunnel or on the wall opposite to the one where nozzles are visible. Therefore, features 1.7, 1.8 and 1.8.1 are not directly and unambiguously disclosed in E3.

The technical effect of feature 1.11.1 is only mentioned in the contested patent. No evidence has been provided that changing the amount of applied heat along a drying tunnel for coating films belongs to the skilled person's general knowledge. The fact that claim 5 of E3 discloses an adjustable intensity for the IR emitters does not imply that they are individually adjustable, nor that they should be adjusted in the claimed way.

Document E6 is from a completely different technical field and would not be considered by the skilled person.

## **Reasons for the Decision**

### **Main request**

- 1. Added subject-matter, Article 123(2) EPC**
- 1.1 Features 1.3, 1.5, 3.3 and 3.5 (air temperature ranges)**

The basis for assessing the extent of the original disclosure is what the skilled person would have

understood from the originally filed application as a whole.

In the present case, originally filed independent claims 1 and 8 taught the skilled person that the invention focused on supplying warm air "having a temperature less than a hardening temperature of said coating film". No other parameter of the air flow or required heat transfer rate is defined in the originally filed independent claims.

Thus, the skilled person would understand from the claims as originally filed that the warm air temperature is, by itself, an essential aspect of the invention. Furthermore, the hardening temperature is a conventional parameter of coating films (see E12, page 750, penultimate paragraph of the point "Spiegel": "Vernetzungtemperaturen").

In this context, the skilled person would understand that the temperature range of 40 to 100°C, mentioned in the passage of the originally filed description page 6, lines 24 to 28, is an example of a temperature according to originally filed independent claims 1 and 8, and that it is not inextricably linked to the air flow volume and humidity also specified in relation to that particular embodiment. Similar considerations apply to the passage at originally filed page 7, lines 7 to 4 from the bottom.

Consequently, no inextricable link with other parameters relating to the air flow is apparent and there is no intermediate generalisation.

Similarly, since the temperature of the cooling air is defined in originally filed claim 4 (dependent on claims 3 - corresponding to current features 1.11.1 and 3.10 - and 1) as being "set to be less than that of

said warm air", the skilled person understands that the cooling temperature of the invention is defined solely as a function of the warm air temperature, independently of other parameters related to the air flow.

Thus, the example disclosed in the last sentence of the first paragraph of originally filed page 7, or in the second paragraph of page 8, would be understood as a range which is not inextricably linked to the air flow volume of the particular embodiment.

In conclusion, features 1.3, 1.5, 3.3 and 3.5 meet the requirements of Article 123(2) EPC.

**1.2 Features 1.7, 1.8, 1.8.1, 3.7.1, 3.7.2 and 3.7.3  
(prevention of positive cooling)**

**1.2.1 Positive cooling vs overheating suppression of IR heaters**

The passage at page 5, lines 10 to 12 of the description as filed, states:

"each of the IR heaters 11 is disposed to be exposed to a stream of warm air in the passage 3, to suppress overheating thereof. This makes it possible to prevent deterioration in durability of each of the IR heaters 11".

From this, it is clear that an air stream flows constantly through passage 3 (i.e. the interior of the drying tunnel) since air injected into the drying tunnel by the nozzles must exit the tunnel somehow; normally this would be through the product entry and exit ends of the tunnel. In the present case, as the claimed invention prevents an air flow from the heating

section towards the cooling section (due to features 1.6, 3.6), warm air will tend to flow along the tunnel towards the product entry end.

Originally filed claim 6 specifies that warm air streams are merged to change a direction of a specific stream of warm air (corresponding to current features 1.8 and 3.7.2). The originally filed description explains that this is done to avoid direct collision of the air stream originating from a specific nozzle with an IR heater (see page 6, lines 16 to 24). This undesired cooling of the IR heater is identified in page 17, second paragraph, as "positive cooling".

It is therefore clear that this "positive cooling", characterised by a direct collision of the air stream flowing at a high speed from one nozzle against an IR heater, is different from the cooling carried out on the same IR heater by the air stream flowing along the drying tunnel. Thus, the avoidance of a positive cooling is not in contradiction with suppressing overheating since different air-streams are used.

Further, since the characteristic concerning the suppression of overheating of IR heaters is not claimed in claims 1 and 3, it cannot raise a problem of added subject-matter.

### **1.2.2 Intensity and arrangement of IR heaters and warm air nozzles.**

Originally filed claim 6 (corresponding to feature 1.8, 3.7.2) discloses the feature of merging warm air streams to change a direction of a specific stream of warm air. The skilled person would understand that figure 2 and page 6, lines 16 to 20 of the description

as filed, relate to one particular configuration of nozzles which allow this feature to be put into practice.

The skilled person is aware that the intensity of the IR heaters is selected according to the needs of the case at hand. Furthermore, the features of claim 6 and the corresponding features in claims 1 and 3 concern the positive cooling and not the suppression of overheating, which is the context in which the intensity of the IR heaters is mentioned in the particular embodiment (see page 5, lines 10 to 12).

1.3 In view of the above, the main request fulfils the requirements of Article 123(2) EPC.

## **2. Lack of disclosure, Article 83 EPC**

### **2.1 Hardening temperature of a water-based paint**

Feature 1.3.1 of method claim 1 defines that the warm air temperature must be less than a hardening temperature of the coating film.

Feature 1.9.1 of method claim 1 defines that the coating film is a coating film of a water-based paint.

Consequently, the method is limited to one using water-based paints exhibiting a hardening temperature. As shown in E12 ("Vernetzungstemperaturen"; see page 750, penultimate paragraph of the point "Spiegel"), the "hardening temperature" is a well-known parameter in this technical field and is usually provided by the paint manufacturer.

Concerning device claim 3, the coating film specified in feature 3.8.1 is not part of the claimed device.

However, this would amount at most to a lack of clarity, which is not an issue in opposition to granted claims (feature 3.3.1 was contained in granted claim 1, and feature 3.8.1 was contained in granted claim 8, and see decision of the Enlarged Board of Appeal G3/14), and not to a lack of disclosure.

## **2.2 Lack of effect of some claimed parameter values**

The ranges of temperatures for both the warm and cooling air are clearly defined in features 1.3, 1.5, 3.3 and 3.5, and precise values are given for the end points. A clear relationship between the warm and cooling air temperatures (the former being higher than the latter) is also defined.

Therefore, the skilled person is provided with all the information needed to provide a temperature within the claimed ranges of the invention. It might well be that some warm air temperatures are less efficient for drying a coating film, thereby involving a longer drying period or other disadvantages, but Article 83 EPC only requires that the claimed invention is disclosed such that it can be reproduced.

The same reasoning applies to the air flow volumes. Features 1.6 and 3.6 define a requirement: the cooling air flow volume must be equal to or greater than the warm air flow volume. The skilled person would have no difficulty in implementing this requirement.

## **2.3 Lack of disclosure of further parameters**

The claimed invention aims at solving a number of problems in connection with the use of the drying tunnel, such as the problem of coating quality linked

to the hardening of the coating film (feature 1.3.1, 3.3.1), and the protection and optimisation of IR heaters (feature 1.8, 3.7.2).

The appellant has not shown that the skilled person does not have at their disposal all the necessary information to implement the invention in connection with the features addressing these problems.

The fact that other parameters have to be adjusted in order to optimise the drying of the coating film when implementing the invention cannot be interpreted as a lack of disclosure of the invention, since it falls within the realm of routine exercise for the skilled person.

#### **2.4 Alleged contradiction between positive cooling and suppression of overheating**

As explained in point 1.2.1 above, the suppression of overheating of the IR heaters does not form part of the claimed invention. Moreover, the skilled person understands when reading the patent specification how to provide this effect whilst avoiding positive cooling of the IR heaters (features 1.8, 1.8.1, 3.7.2, 3.7.3; see column 5, lines 50 to 54, corresponding to the cited passage of the originally filed application).

No undue burden for the skilled person can thus be observed in connection with this aspect of the invention.

2.5 In conclusion, the requirements of Article 83 EPC are met.



**3. Inventive step, Article 56 EPC**

**3.1 Closest prior art, E3**

The Board agrees with the parties that E3 constitutes the closest prior art, since it discloses a similar arrangement of nozzles 6 and IR heaters 5 in a tunnel for drying a coating film on an exterior panel of a box-shaped workpiece (namely, a car body).

**3.2 Features 1.7, 1.8, 1.8.1, 3.7.1, 3.7.2, 3.7.3  
(prevention of positive cooling)**

As the respondent has pointed out, the sole figure of E3 is of a schematic nature. However, in combination with the description at column 3, lines 5 to 8, it provides the necessary information to understand how the nozzles 6 supplying warm air streams and the IR heaters 5 are arranged within the tunnel. The description provides a direct and unambiguous disclosure of the nozzles and IR heaters alternating in the opposed walls and the ceiling, even if their arrangement in one of the lateral walls and in the ceiling is not explicitly disclosed by the figure.

Although, a precise alignment of a particular nozzle in the direction of a particular IR heater cannot be established from the figure or the description, feature 1.7, 3.7.1 does not define such a precise alignment. The feature merely defines that the direction of a specific warm air stream causes collision with an IR heater.

Since an air stream starts broadening immediately after having been ejected by a nozzle, and since the figure

(in combination with the description) clearly discloses IR heaters and nozzles disposed in opposed walls in the tunnel, it must be concluded that, even in the absence of a precise alignment between nozzle and IR heater, the warm air streams flowing from one wall would collide with the IR heaters arranged in the opposite wall.

Since the nozzles and IR heaters in the ceiling of the tunnel are arranged in the same pattern as the walls, it is evident that the warm air streams flowing from the nozzles in the ceiling must merge with the warm air streams flowing from the nozzles in the walls. This merging of the two air streams inevitably involves a change of direction of both air streams. Therefore, it must be concluded that the merging disclosed in E3 prevents "positive cooling" in the sense of the claims, because the warm air streams flowing from one of the lateral walls will not impact directly the IR heaters on the opposed wall.

Thus, E3 discloses features 1.7, 1.8, 1.8.1, 3.7.1, 3.7.2 and 3.7.3.

**3.3 Feature 1.6, 3.6 (cooling air flow volume equal to or greater than warm air flow volume)**

The Board agrees with the respondent that features 1.6, 3.6 are not disclosed in E3, since the presence of twice the number of nozzles in the cooling area does not necessarily mean there is a higher air flow volume since the flow rate through each nozzle may be less.

**3.4 In conclusion, the subject-matter of claim 1 differs from the method of E3 in that:**

(i) a flow volume of said cooling air in said downstream area of said drying line is set to be equal to or greater than that of said warm air in said upstream area of said drying line,

(ii) an output level of said radiant rays is maximized at an upstreammost position of said drying line, and gradually reduced toward a downstream side of said drying line.

Similarly, the subject-matter of claim 3 differs from the device known from E3 in that:

(i) the apparatus is configured such that a flow volume of cooling air from the cooling-air blow port in the cooling zone is set to be greater than that of said warm air from the warm-air blow port in the heating zone,

(ii) and wherein said infrared heater is configured such that an output level of said infrared heater is set in such a manner as to be maximized at an upstreammost position of said drying furnace, and gradually reduced toward the downstream side of said drying furnace.

3.5 These features have the respective technical effects of:

(i) avoiding a flow of warm air into the downstream cooling zone (see description, column 15, lines 11 to 13), such that accurate cooling of the coating film can be achieved; and

(ii) heating up the coating film at a higher rate at the beginning of the drying line than in the rest of it

(see description, column 14, lines 19 to 28), such that the cooling load for the dried coating film can be reduced.

The appellant submits that the objective technical problem is one of optimising a drying tunnel for a specific workpiece and coating. However, this definition is too broad and does not reflect the specific technical effects of the differentiating features.

The combined technical effect of the differentiating features is to speed up the cooling step and use less energy in the drying line, since the first one avoids wasting energy in providing cooling air to compensate the warm air which could enter from the heating section, and the second one optimises the IR radiation emitted by the IR heaters, such that less cooling is necessary later on to cool down the workpiece and its coating film.

Therefore, there is a synergistic effect between the differentiating features and they cannot be treated separately in the way proposed by the appellant since they both contribute to solving the objective technical problem of optimising the cooling step whilst improving the energy efficiency of the drying tunnel.

Claim 5 of E3 discloses that the IR heaters can provide an adjustable intensity. However, there is no indication as to whether they should be simultaneously or individually adjusted and, in the latter case, how that individual adjustment should be carried out.

The disclosure in column 3 of E3, lines 15 to 21, concerning the provision of different warm air

temperatures in the heating section 2, also would not lead the skilled person in the direction of the invention since no details are provided as to how warm air temperature should vary along the drying line. Further, any teaching about the management of heat transferred by warm air is not necessarily applicable to heat transferred by IR radiation, given the different nature of heat transmission in each case.

Furthermore, the appellant has provided no evidence to support its assertion that it is common general knowledge that the car body must be provided with more heat at the beginning of a drying tunnel.

E6 concerns the drying of ivory billiard balls in order to stabilise their shape and size (see column 1, lines 12 to 17). There is no mention of drying paint. Since both the product and the purpose are so far away from and unrelated to the technical field of drying coating films in the automobile industry, E6 would not be taken into consideration by the skilled person.

Similar considerations apply to the independent apparatus claim 3.

3.6 In view of the above, the subject-matter of claims 1 and 3 involves an inventive step.

3.7 Thus the impugned decision was correct and the appeal against it not allowable.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



C. Spira

C. Donnelly

Decision electronically authenticated