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Title of invention:
System and method for temperature control in a temperature processing machine for food product containers

Patent Proprietor:
Gebo Packaging Solutions Italy SRL

Opponent:
KHS GmbH

Headword:
Temperature prediction for containers/GEBO

Relevant legal provisions:
EPC Art. 56, 84

Keyword:
Inventive step - main and fifth auxiliary requests (no)
Clarity - second and third auxiliary requests (no)

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Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1428/18 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 9 November 2021

Appellant I: (Opponent)	KHS GmbH Juchostraße 20 44143 Dortmund (DE)
Representative:	Glück Kritzenberger Patentanwälte PartGmbB Hermann-Köhl-Straße 2a 93049 Regensburg (DE)
Appellant II: (Patent Proprietor)	Gebo Packaging Solutions Italy SRL Via La Spezia 241/a, Parma (IT)
Representative:	Di Sciuva, Michele Studio Torta S.p.A. Via Viotti, 9 10121 Torino (IT)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 5 April 2018 concerning maintenance of the European Patent No. 2702879 in amended form.**

Composition of the Board:

Chair	K. Bengi-Akyürek
Members:	R. Gerdes
	R. Winkelhofer

Summary of Facts and Submissions

I. The present appeals arise from the interlocutory decision of the opposition division to maintain the present European patent in amended form (Article 101(3)(a) EPC). The decision relied, *inter alia*, on the following prior-art documents:

D1: EP 1 972 210 A1 and
D5: EP 2 568 829 B1.

II. Oral proceedings before the board were held on 9 November 2021.

- Appellant I (opponent) requested that the decision under appeal be set aside and that the patent be revoked.

- Appellant II (patent proprietor) requested that the decision under appeal be set aside and that the opposition be rejected (**main request**), or that the patent be maintained as amended according to one of the **second, third and fifth auxiliary requests**. The first, fourth and sixth auxiliary requests, filed with the statement of grounds of appeal, were withdrawn during the oral proceedings before the board.

III. Claim 1 of the **main request** reads as follows (numbering of features as indicated in the appellants' statements of grounds of appeal):

1. "A control system for controlling a machine (1) for the temperature processing of containers (3) for food products, the machine (1) including

1.1 a movement element (2) for moving the containers (3) to be processed on a movement path along which at least one temperature-processing zone (6) is defined, where the temperature of the containers (3) is to be brought to a desired value,

1.2 the temperature-processing zone being divided into a number of sub-zones (6a-6c)

1.3 each having a respective injection assembly (8) for injecting processing fluid (9) on the containers (3)

1.4 and a respective adjusting assembly (17, 18, 19) for setting the temperature of the injected processing fluid (9);

1.5 the control system including a control unit (20) operatively coupled to the adjusting assemblies (17, 18, 19) of the sub-zones (6a-6c) in order to regulate the temperature of the processing fluid (9),

1.6 wherein said control unit (20) is configured to: perform a prediction of the output temperature of the containers (3) located on said movement path, i.e. a temperature the containers (3) would reach at [the] output from said temperature-processing zone (6), based on a current operating condition of the machine (1) and a past thermal trend for said containers (3); and

1.7 control said adjusting assemblies (17, 18, 19) based on the predicted output temperature;

characterized by

1.8 further comprising a presence sensor (22) located at the input of said movement path and configured to detect the presence of containers (3) at input to said machine (1);

1.9 wherein the control unit (20) is operatively coupled to the presence sensor (22)

1.10 and is configured to: locate the position of containers (3) along said movement path based on presence information provided by said presence sensor (22); and perform the temperature prediction based on the located position of the containers (3) along said movement path."

IV. Claim 1 of the **second auxiliary request** differs from claim 1 of the main request in the following additional **features A, B1, B2 and C** which have been appended to the claim:

"said control unit (20) being configured to perform the following operations in a cyclical manner:

- **A:** detecting (25) the presence of said containers (3) at selected location[s] along said movement path, based on the presence information detected by said presence sensor (22) and the tracking of the same presence information;
- **B1:** for each said located container, predicting (26) said output temperature that same said container (3) will have at the output of said machine (1), at the end of the forward movement defined by said movement element (2), i.e. after the temperature processing is completed;
- **B2:** said prediction step being carried out only if, and, where said products are effectively present inside said machine (1); and
- **C:** in case the predicted output temperature for said located container (3) does not satisfy a desired condition, as a [sic] checked at a step (27), adjusting the temperature of said processing fluid (9) sprayed by one or more of said injection assembly (8) at, and/or

downstream, the location of said located container (3) with respect to said movement path."

V. Claim 1 of the **third auxiliary request** is based on claim 1 of the second auxiliary request and contains the following additional feature appended to the claim:

"said control unit (20) being able to predict said output temperature of said located containers (3) based on the monitoring of said thermal trend followed by said products during the upstream portion of the forward movement with respect to said detected location, and said current operating condition of said machine (1), including the temperature currently set for said injection fluid (9) at said injection assembly (8) in the same detected location and downstream thereof."

VI. Claim 1 of the **fifth auxiliary request** is based on claim 1 of the second auxiliary request and contains the following additional features:

"the machine (1) being a pasteuriser, and the movement path further defining at least one heating zone (4), where temperature of the containers (3) entering the machine (1) is raised, and a heat treatment zone (5), consecutive to the heating zone (4) along the movement path, where the products are designed to receive a desired pasteurisation treatment"

and

"wherein the temperature-processing zone is a cooling zone (6), consecutive to the heat treatment

zone (5) along the movement path, where temperature of the containers (3) is to be lowered up to a desired value".

Reasons for the Decision

1. The opposed patent

The patent in suit relates to temperature processing of containers designed to contain food products, in particular to control the cooling temperature in a tunnel pasteurising machine for pasteurising packaged food products. In order to process the containers, a pasteuriser is usually divided into three main processing zones: a *heating zone* in which the product temperature is gradually raised; a *heat-treatment zone* in which the product temperature is brought to, and kept at, a pasteurising temperature for a desired time interval; and a *cooling zone* in which the product temperature is gradually lowered to a desired output temperature. At the end of the temperature processing (i.e. at the output of the pasteuriser), it is required for the food products to have been kept above a predetermined temperature for at least a predetermined time, so as to have accumulated at least a predetermined quantity of pasteurisation units (PUs). Problems may arise when the tunnel pasteuriser undergoes unforeseen conveyor stops or when the moving conveyor is not (fully) loaded with products. This may result in a general temperature increase in all the zones of the pasteuriser (see paragraphs [0001] to [0003] and [0020] to [0022] of the patent specification).

In order to avoid such effects, according to the patent in suit, a "presence sensor" is foreseen at the entrance of the pasteurising machine and coupled to the control unit. The presence information provided by the presence sensor is tracked along the forward movement path such that the location of the containers inside the pasteurising machine can be determined during their processing. By monitoring the temperature of the products or containers and implementing a control based on a predicted output temperature for each container, it is possible to calculate the thermal trend to which the individual containers will be subjected in the remaining portion of the forward movement path, up to the output of the pasteurising machine. The temperature of the containers can then be controlled by adjusting the temperature of the processing fluid sprayed onto the containers (see paragraphs [0041] to [0045] and [0051] to [0053] of the patent).

2. Main request

2.1 It is undisputed that prior-art document **D1** can be considered the closest prior art with respect to the patent in suit (having overlapping inventors with D1).

Similarly to the patent in suit, D1 relates to temperature control of food products in a pasteuriser having a movement element and three temperature-processing zones each with a number of sub-zones and respective injection and adjusting assemblies. It also comprises a control unit coupled to the adjusting assemblies of the sub-zones in order to regulate the temperature of the processing fluid. The control unit predicts the temperature the containers would reach at the output of the machine based on the current settings of the machine and a past thermal

trend for the containers. Based on the predicted output temperature, the control unit changes the settings of the adjusting assemblies (see paragraphs [0001], [0004], [0013], [0015], [0022] and [0025] to [0033]). Hence, D1 discloses a control system according to the preamble of claim 1.

2.2 The board agrees, insofar, with appellant II that D1 does not disclose a "presence sensor" coupled to the control unit as required by features 1.8 and 1.9 of present claim 1. In addition, D1 is silent about *how* products are located (first part of feature 1.10).

Appellant II further argued that D1 also failed to disclose the second part of feature 1.10, because both parts of feature 1.10 should be read in combination. The located position of the containers of feature 1.10, second part, could only be understood as the located position detected based on the presence sensor.

However, the board cannot see an indissoluble link between the means by which the position of a container is determined and the temperature prediction which employs that position information. Hence, the disclosure of the second part of feature 1.10 can be assessed independently of that of feature 1.10, first part. As a result, claim 1 differs from D1 by **features 1.8, 1.9 and 1.10 (first part).**

2.3 As correctly argued by appellant II, on the basis of the distinguishing features, the output temperature of the processed products can be reduced. Consequently, the board concurs with appellant II's formulation of the objective technical problem "how to improve the control of the pasteuriser according to D1 under changing operating conditions in order to reduce the

deviation in the output temperature of the processed products". This objective problem is directed at a person skilled in the field of automation systems for food processing.

2.4 Similar to D1, document **D5** relates to a pasteuriser having several temperature-processing zones. It also addresses the problems of deviations in the pasteurisation process due to changing operating conditions, in particular due to fluctuations in input quantity of products. In order to adapt the pasteuriser to these changing operating conditions, the pasteuriser provides an improved control including variation of the temperature and volume of the spraying liquid. D5 describes how to control the machine in an energy-efficient manner based on both *presence information* recorded via sensors and on the *occupancy level* at a specific position within the machine (see paragraphs [0001], [0004], [0012], [0013] and [0033] to [0036]).

2.5 Appellant II argued that document D5 would have been disregarded by the skilled person trying to solve the objective technical problem, because D5 did not teach to predict the temperature at the output of the machine. D5 did neither disclose tracking of containers along the movement path nor a temperature prediction on the basis of the located position of the containers along the movement path, i.e. on the basis of the fact that containers were present on the movement element. The aim of D5 differed from that of D1, because D5 was targeted at controlling the *speed* of the underlying conveyor belt.

2.6 This is not convincing. It is correct that the control unit of D5 does not use a predictive control algorithm;

however, D5 discloses the use of a *presence sensor* to track every individual container located on the movement path and a corresponding adjustment of the control parameters including an adjustment of the spraying medium (see paragraphs [0028], [0036], [0045] and [0046]). The skilled person in the field of automation systems for food processing would have recognised that the acquisition of presence information was to be applied independently from the type of control (see point 2.2 above). Hence, the skilled person would not have encountered any obstacle in applying the presence sensor of D5 to the predictive temperature control of D1. With regard to the prediction algorithm, there is no difference between the prediction of the patent in suit and that of D1. Actually, the patent in suit itself refers to D1 concerning the very details of the temperature prediction algorithm (see paragraph [0049]). There is also no need to adapt the overall prediction process of D1 if the presence sensor of D5 is applied. Instead, the sensor can be integrated in a straightforward way without being faced with technical problems. Hence, the skilled person would have combined documents D1 and D5 to arrive at the claimed subject-matter.

2.7 As a consequence, the subject-matter of claim 1 of the main request does not involve an inventive step in view of D1 in combination with D5 (Articles 100(a) and 56 EPC).

3. Second and third auxiliary requests

3.1 The additional **feature B1** of claim 1 of the **second auxiliary request** refers to a prediction of the temperature that a container will have at the output of the machine (see point IV above). This can only be

understood as a reference to the output of the *last* temperature-processing zone. That understanding is reinforced by the subsequent phrase of feature B1 "at the end of the forward movement defined by said movement element (2), i.e. after the temperature processing is completed".

In contrast, **feature 1.6** specifies that the predicted output temperature is a temperature that the containers would reach at the output of a temperature-processing zone (see point III above), which - according to feature 1.1 - could be any one of several temperature-processing zones. However, only one of these temperature-processing zones is located at the *output* of the machine. Therefore, there is an ambiguity in that **feature B1** refers to the prediction of a temperature at a position of the machine that is more restricted than according to **feature 1.6**.

3.2 Appellant II argued that feature B1 was extracted from the embodiment of paragraph [0045] relating to the cooling zone. However, the patent in suit related to different types of machines in the area of temperature processing of containers for food products such as bottle washers (cf. paragraphs [0059] and [0062] of the patent in suit). Hence, the prediction could indeed be effected for every temperature-processing zone.

3.3 This is likewise not convincing. Even if the prediction could be carried out for different temperature-processing zones, claim 1 remains ambiguous in the sense that it is not clear whether it is restricted to the temperature prediction for the output of the *machine* as required by feature B1, or to the output of *any temperature-processing zone* as specified in feature 1.6. As a consequence, due to the diverging

references to a prediction of the temperature at the "output of said machine" according to feature B1 and at the "output from said temperature-processing zone" of feature 1.6, a lack of clarity results (Article 84 EPC).

3.4 The additional feature of claim 1 of the **third auxiliary request** has no bearing on the ambiguity caused by features 1.6 and B1. Hence, claim 1 of the third auxiliary request is not clear for the same reasons as for claim 1 of the second auxiliary request.

4. Fifth auxiliary request

4.1 Claim 1 of the fifth auxiliary request further specifies that the "temperature-processing zone is a cooling zone". Due to this restriction, it is clear that the prediction is carried out for the output of the *cooling zone* which is equivalent to the output of the *machine* (see paragraphs [0002] and [0003] of the patent in suit). Hence, the objection regarding lack of clarity against claim 1 of the second auxiliary request is overcome by this amendment (Article 84 EPC).

4.2 The first and second additional features of claim 1 of the fifth auxiliary request (see point VI above) specify that the machine is a pasteuriser. They also refer to some basic components of the pasteuriser as well as to the functionality of the cooling zone. It is undisputed that these features are disclosed in D1 (see paragraphs [0001]). In addition to those features and features 1 to 1.10 of claim 1 of the main request, claim 1 of the fifth auxiliary request comprises the added features of claim 1 of the second auxiliary request, i.e. features A, B1, B2 and C.

4.3 **Feature B2** has to be understood as meaning that the respective output temperature is only predicted if there is indeed a "located container", i.e. a product, in the machine ("for each said located container"). The board agrees with the decision under appeal (see Reasons 5.2) that **feature A** is disclosed in D1 (see paragraphs [0026] and [0029] together with paragraphs [0032] and [0036]). **Feature C** relates to the adjustment of the temperature of the processing fluid. However, this feature is also disclosed in D1 (see paragraphs [0030] to [0033]).

Appellant II argued that **features B1 and B2** taken together could only be interpreted such that the control unit predicted the container's output temperature only when and where this container was positively present on a given spot along the movement path. This situation was detected and tracked by the presence sensor and communicated to the control unit. As acknowledged in the appealed decision, this situation was tantamount to say that the temperature prediction process omitted any empty spot on the movement conveyor. In the oral proceedings before the board, appellant II stated expressly that **feature B1** already implied this restriction and that **feature B2** had merely been added to claim 1 to remove any ambiguity.

4.4 The board agrees that feature B1 must be already understood in that restricted sense. Consequently, the board concurs with appellant I that feature B2 is redundant in view of that understanding. Nevertheless, even in that restricted sense, feature B1 is at least implicitly disclosed in D1, which consistently refers to the calculation of the predicted temperature for "products at each reference point" and to a calculation

of the "thermal trend to which the individual products will be subjected" (see e.g. paragraphs [0029], [0047] and claim 1). This wording is understood such that the calculation step, i.e. the temperature prediction, is *only* carried out if a product is present. In other words, in light of the teaching of D1, it would not make technical sense to perform such temperature predictions for a "product" that is not at the respective "reference points", i.e. for an "empty spot" in the machine (as appellant II put it).

4.5 Hence, the additional features of claim 1 of the fifth auxiliary request are known from D1. Therefore, the reasoning regarding inventive step of subject-matter of claim 1 of the main request applies *mutatis mutandis*.

4.6 As a result, the fifth auxiliary request is not allowable either, for lack of inventive step in view of D1 in combination with D5 (Article 56 EPC).

5. Conclusion

Since none of the claim requests of appellant II is allowable, the patent has to be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chair:

B. Brückner K. Bengi-Akyürek

Decision electronically authenticated