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File Number: T 698/91 - 3.4.2

Application No.: 88 201 221.4

Publication No.: 0 303 303

Title of invention: A method and an apparatus for detecting a possible leak in a vacuum package

Classification: G01M 3/32

D E C I S I O N
of 22 June 1992

Applicant: Product Suppliers AG

Headword:

EPC Article 56 EPC

Keyword: "Inventive step (no)"

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Case Number : T 698/91 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 22 June 1992

Appellant : Product Suppliers AG
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Decision under appeal : **Decision of Examining Division of the European Patent Office dated 14 May 1991 refusing European patent application No. 88 201 221.4 pursuant to Article 97(1) EPC.**

Composition of the Board :

Chairman : E. Turrini
Members : W.W.G. Hofmann
L.C. Mancini

Summary of Facts and Submissions

I. European patent application No. 88 201 221.4 (publication No. 0 303 303) was refused by decision of the Examining Division.

II. The reason of the refusal was that the subject-matter of the Claims 1 to 4 on file did not involve an inventive step, having regard to the following prior art documents:

(D1) EP-A-0 152 981 and
(D2) GB-A-1 386 239.

III. The Applicant (Appellant) lodged an appeal against this decision.

IV. In a communication pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, the Board expressed its provisional opinion that the application did not appear to meet the requirement of inventive step (Article 56 EPC), having regard to the above cited documents and to the further one:

(D3) Patent Abstracts of Japan, Vol. 9, No. 54(P-340)[1777], 8 March 1985, & JP-A-59-190632 (Toyoda Gose K.K.) published on 29 October 1984.

V. Oral proceedings were held, at the end of which the Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the following documents:

- Claims 1 to 4 as filed during oral proceedings,
- description pages 1 to 14 as originally filed and

modified in correspondence with the amended claims,
- drawings sheets 1/6 to 6/6 as originally filed.

VI. Independent method **Claim 1** according to the Appellant's request reads as follows:

"A method of detecting a possible leak in vacuum packages, which comprises placing a vacuum package in a sheet-like and gas-tight envelope; pressing the envelope closely against the package; sealing the space ("gauging space") between the package and the envelope pressed against it; ensuring a higher pressure in the gauging space than in the vacuum package; and gauging the pressure in the gauging space as a function of the time for a predetermined gauging period, characterized by a gauging in accordance with above steps simultaneously at least two identical vacuum packages each in a separate identical closed gauging space; ensuring an identical initial pressure in the closed gauging spaces; simultaneously and continuously gauging the pressure in the closest gauging spaces as a function of the time; and determining the difference in pressure variation between pairs of two gauging spaces.".

Independent apparatus **Claim 3** according to the Appellant's request reads as follows:

"An apparatus for detecting a possible leak in vacuum packages according to the method of claim 1, comprising a sheet-like and gas-tight envelope adapted to receive and closely envelop the vacuum package to be tested; pressure means capable of applying pressure to the outside of the envelope to closely envelop the package by the envelope; sealing means for closing the space ("gauging space") between the vacuum package and the envelope pressed against it; and pressure gauge means

("meanse": typing error corrected by the Board) for gauging the pressure in the gauging space as a function of the time for a predetermined period, characterized in that the apparatus comprises at least two of the said identical envelopes each for receiving and closely enveloping an identical vacuum package so as to form individual gauging spaces of equal size each with associated said pressure means, sealing means and pressure gauge means, each of the gauging spaces being connectable to a common space, wherein the pressure gauge means are adapted to simultaneously and continuously gauge the pressure as a function of the time in each gauging space; and pressure differential means for determining the difference in pressure variation between pairs of two gauging spaces.".

Claims 2 and 4 are dependent on Claims 1 and 3 respectively.

VII. In support of the allowability of his request, the Appellant submitted essentially the following arguments.

The present invention as disclosed in Claim 1 is based on the method of detecting a possible leak in a vacuum package as disclosed in D1. Characteristic advantages of this known method are good reliability and high gauging speed, which make it suitable for the large-scale testing of mass-produced vacuum packages. The object of the invention is to improve the prior art method by eliminating or at least reducing disturbing effects on the gauged pressures during testing, effects caused by various factors, in particular, changes in the atmospheric conditions, in the production circumstances and in the abutment against the package of the flexible foil used for forming the gauging space.

Such disturbing effects are typically related to the mass production of vacuum packages according to the method of D1. The method according to D2, on the contrary, is not concerned with the testing of vacuum packages and, moreover, does not employ a small-volume gauging space. A skilled person faced with the problem of achieving said object would, therefore, try to find a solution in publications related to the leak testing of vacuum packages rather than look for testing methods, such as that of D2, in which pressure vessels not intended for packaging of products are tested in empty condition without the use of a special gauging chamber. Moreover, although D2 discloses a manner of eliminating temperature disturbances in the leak testing of pressure vessels and the invention also provides for a correction which may include a temperature effect, the actual way disclosed in D2 for eliminating said temperature disturbances would be fully inadequate for the leak testing of large series of vacuum packages in a quick and dependable fashion.

Therefore, the present invention cannot be considered as a simple application of the method of D2 to that of D1.

As far as D3 is concerned, it is not more relevant than D2. The method according to D3 is not suitable for the large-scale testing of vacuum packages. Essential differences with regard to the present invention consist in that only one container is tested at a time, by comparing it with a standard sample, empty containers are tested and no separate gauging space is provided (as in D2). Moreover, the necessity of temperature corrections is not mentioned.

The arguments valid for independent method Claim 1 similarly apply to independent apparatus Claim 3.

Reasons for the Decision

1. The appeal is admissible.

2. Allowability of the amendments

2.1 Method Claim 1 is based on the originally filed Claim 1 with the following amendments:

- each vacuum package is placed in a sheet-like gastight envelope, which envelope is pressed closely against the package, a gauging space being formed between the package and the envelope pressed against it (see page 6, line 20 to page 7, line 7 and the Example II on pages 13 and 14 of the originally filed description),
- the pressure is continuously gauged in the closed gauging spaces as a function of the time (see the pressure/time diagrams of Figures 2, 3 and 4),
- the difference in pressure variation is determined between pairs of two gauging spaces (see the original Claim 1, line 17, page 5, line 25 to page 6, line 2 as well as the diagrams of Figure 4 concerning the case of four vacuum packages, in which the differences M_b-M_a, M_c-M_a and M_d-M_a are referred to).

Dependent Claim 2 corresponds to the originally filed Claims 4 and 5.

2.2 Apparatus Claim 3 is based on the originally filed Claim 6 with the following amendments:

- the apparatus comprises a sheet-like gastight envelope adapted to receive and closely envelop the respective

vacuum package to be tested and pressure means for applying pressure to the outside of the envelope to closely envelop the package by the envelope, a gauging space being formed between the vacuum package and the envelope pressed against it (see page 6, line 20 to page 7, line 7 and the Example II on pages 13 and 14 of the originally filed description),

- the pressure gauge means is adapted to continuously gauge the pressure as a function of the time (see the pressure/time diagrams of Figures 2, 3 and 4),
- the pressure differential means determines the difference in pressure variation between pairs of two gauging spaces (see the original Claim 1, line 17 as well as the diagrams of Figure 4 concerning the case of four vacuum packages, in which the differences M_b-M_a, M_c-M_a and M_d-M_a are referred to).

Dependent Claim 4 corresponds to the originally filed Claims 4 and 5.

2.3 The originally filed description should only be brought into correspondence with the amended claims.

2.4 Therefore, the amended version of the patent application, on the basis of which the Appellant requests that a patent be granted, does not contravene Article 123(2) EPC, since it does not include subject-matter extending beyond the content of the application as originally filed.

3. Novelty

3.1 D1 discloses a method and an apparatus for detecting a possible leak in a vacuum package, whereby the method comprises the steps according to the precharacterising part of valid Claim 1 of the present application.

The method of Claim 1 is essentially distinguished therefrom by the steps of simultaneously and continuously gauging the pressure in at least two identical gauging spaces as a function of time, the gauging spaces surrounding identical vacuum packages and having an identical initial pressure, and then determining the difference in pressure variation between pairs of two gauging spaces.

3.2 Claim 3 refers to an apparatus for detecting a possible leak in vacuum packages according to the method of Claim 1.

The subject-matter of Claim 3 is essentially distinguished from the apparatus known from D1 by the fact that there are at least two identical gauging stations connectable to a common space and means for determining the differential pressure as a function of the time between pairs of two gauging spaces.

3.3 The further documents cited in the Search Report are less relevant than D1.

3.4 Therefore, the subject-matter of independent Claims 1 and 3 is novel in the sense of Article 54 EPC.

4. Inventive step

4.1 Claim 1

4.1.1 It is well-known that vacuum packages containing all kinds of commercial food need to be tested for leakage. Considering that such vacuum packages are normally supplied by a continuous mass-production line, pressure gauging methods have been developed enabling to shorten

the detection time of leaks to only a few seconds (see for instance D1, page 2, lines 21 to 25). However, changes in pressure in a package do not necessarily depend only on the presence of a possible leak; pressure variations may also be caused by other factors like atmospheric conditions and production circumstances, in particular temperature changes during the gauging of a package having a temperature differing from the ambient temperature. The fact that, independently of a leak, such pressure variations may occur, is not surprising. Indeed, a skilled person gauging the pressure as a function of time according to the method of D1 for a series of packages, must necessarily notice this fact. Moreover, the effect of temperature influences on pressure gauging results are already considered in the prior art document D2 (see page 1, lines 82 to 89 and page 2, lines 74 to 83).

Starting from the method according to D1, which represents the closest prior art document, the objective problem underlying the patent application in suit can be seen in the improvement of the reliability of this method of detecting possible leaks in the vacuum packages by restricting or even excluding the influence of disturbing factors, like atmospheric conditions or production circumstances or slight changes in the abutment of the flexible foil used for forming the gauging space against the vacuum package, on the pressure gauging. This problem corresponds to the statement in the description on page 3, lines 23 to 27.

Considering that the presence of such disturbing factors is not surprising and that temperature effects as possible disturbing factor are already mentioned in the prior art, it appears that no inventive step can be perceived in the fact alone of stating this problem.

4.1.2 The problem is solved by the steps of the method Claim 1.

As it is stated in the description on page 4, lines 11 to 18, "the invention is based on the phenomenon that at any given moment, the disturbing influences on the gauging results of a plurality of packages to be gauged simultaneously, are usually identical or substantially identical. This applies in particular when, as usual, the packages to be gauged simultaneously are obtained from a series of packages supplied continuously by a production line and which are in the same condition". Indeed, the circumstances that the packages are normally meant to be supplied by an automatic mass-production line, render it self- evident that such a phenomenon of usually identical influences exists. Moreover, a skilled person practising the method according to D1 could not but realise that the variation of the pressure as a function of time was usually substantially the same for a series of consecutive packages.

The skilled person, starting from the gauging method according to D1, which offers the advantage of a very short gauging time, expecting that disturbing influences on the gauging results can take place (see e.g. D2 for temperature effects) and being aware of the fact that these influences are substantially identical for vacuum packages simultaneously tested immediately after their production in a continuous mass-production line, will consider which measure should be taken so as to obtain correct results in which the effects of said disturbing influences are removed.

4.1.2.1 Since in D2 the problem of temperature influences on pressure gauging results is already mentioned, he is

directly led to consider the solution proposed by said document.

According to it (see page 1, lines 25 to 40 and the figures), a method of testing a plurality of pressure vessels for leakage comprises the steps of connecting together a plurality of liquid reservoirs associated with respective manometers, the number of which is at least equal to the number of pressure vessels, connecting each pressure vessel to a respective one of the manometer reservoirs, pressurising the pressure vessels to a common pressure, isolating the manometer reservoirs from each other and observing the levels of liquid in the respective manometers connected to said reservoirs to detect leakage from the individual vessels.

By coupling the individual manometer reservoirs to one another, and then pressurising the reservoirs to a chosen reference pressure, the individual liquid columns will attain identical levels, irrespective of any physical dissimilarity of the individual manometer tubes. If, at this stage, the reservoirs are isolated from each other, any deviation which may appear in any of the manometers from the reference pressure, can be detected by direct comparison between the manometer tubes (see page 1, lines 52 to 67), whereby the expression "direct comparison" means that the difference in liquid levels between two manometers, i.e. in pressure between two vessels, is determined. The simultaneous detection of leaks in a plurality of pressure vessels is thus possible, any such leaks being evidenced by pressure drops registered by the respective manometers, after the initial pressurisation and isolation of the manometers.

D2, furthermore, discloses on page 1, lines 85 to 89 read in conjunction with page 2, lines 74 to 83 that, should a uniform temperature variation occur during the gauging process, the pressure vessels will all be affected, resulting in the liquid columns rising or falling equally.

From D2 the teaching can, therefore, be inferred that, for a simultaneous detection of leaks in a plurality of pressure vessels, a differential measurement is performed by determining the difference in pressure variation between any pair of two pressure vessels. In doing this, a common disturbance like a temperature variation arising during the gauging process, will be eliminated, if the disturbance is the same for all vessels.

It is obvious to the person skilled in the art to apply this teaching of a differential measurement between two pressure vessels, as known from D2, with the corresponding effect as regards the suppression of the influence of disturbing factors as far as they are identical for all the vessels, to the method according to document D1 and thus to arrive at a method according to Claim 1.

4.1.3 The Appellant has argued that the present invention cannot be considered as a simple application of the method of D2 to that of D1 because of numerous essential differences between the two methods. In particular, the method according to D2 differs from the method of D1 in that it is not concerned with the leak testing of mass-produced vacuum packages, does not employ a small-volume gauging space defined by a flexible foil, requires a long gauging time after a prior pressurisation of the vessels to a common pressure, involves a pressure

gauging only at two moments, i.e. at the beginning and at the end of the gauging period.

That these differences, indeed, exist, is not contested by the Board. However, they are irrelevant in the sense that it is not the specific steps of the method of D2 which have to be combined with steps of the method according to D1 in order to arrive at the claimed method. The skilled person has rather to consider the principle, i.e. the differential pressure gauging between two pressure vessels of a plurality of vessels as a solution to the problem of eliminating common disturbing influences supposed to be equal in all the vessels, on which the method of D2 is based, and apply it to the method of D1. This principle is recognised by the skilled person as an abstract teaching of D2 which is not necessarily limited by its application to the actual steps of the method disclosed in this document.

4.1.4 Moreover, realising the self-evident phenomenon mentioned above in section 4.1.2 already appears to contain the solution to the stated problem, though implicitly. In fact, if the measured pressures for two identical vacuum packages contain the same error, it is obvious that the error can be eliminated by forming the difference between said pressures. In other words, the solution consisting in performing a differential measurement is obvious to the skilled person.

4.1.5 Therefore, in view of the foregoing the subject-matter of Claim 1 does not involve an inventive step in the sense of Article 56 EPC.

4.2 Claim 3

4.2.1 The same conclusion of lack of inventive step must be drawn with regard to the independent Claim 3, which

refers to an apparatus for detecting a possible leak in vacuum packages according to the method of Claim 1.

Indeed, the arguments mentioned above with reference to Claim 1 also apply mutatis mutandis to Claim 3.

5. No feature could be detected in the dependent Claims 2 and 4 or in the description, which, in combination with the features of the independent Claims 1 and 3, could lead to allowable claims.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana E. Turrini