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D E C I S I O N
of 13 March 2000

Case Number: T 0780/96 - 3.2.5

Application Number: 90201503.1

Publication Number: 0404222

IPC: B29C 45/17

Language of the proceedings: EN

Title of invention:

Process for manufacturing a plastic crate by injection
moulding, and plastic crate manufactured by said process

Patentee:

WAVIN B.V.

Opponent:

Melea Limited
ALLIBERT EQUIPMENT

Headword:

Relevant legal provisions:

EPC Art. 54, 56

Keyword:

"Novelty (yes)"
"Inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 0780/96 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 13 March 2000

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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 18 July 1996
revoking European patent No. 0 404 222 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: A. Burkhardt

Members: W. R. Zellhuber
W. Moser

Summary of Facts and Submissions

I. The appellant (proprietor) lodged an appeal against the decision of the Opposition Division revoking European Patent No. 0 404 222.

II. The following documents were cited during the proceedings before the Board of Appeal:

E1: US-A-3 506 154;

E3: US-A-4 106 887;

E5: US-A-4 234 642;

E6: EP-A-0 127 961;

E7: GB-A-2 158 002;

E8: EP-A-0 283 207;

E9: EP-A-0 289 230;

E13: WO-A-90/05676;

E15: Kunststoffe im Fahrzeugbau, Evolution statt Revolution, Seiten 47-62, "Gasinnendrucktechnik (GID-Technik) bei Spritzgußteilen der Innenausstattung des neuen Mercedes-Benz-Roadsters Baureihe 129"; Tagung Mannheim 15./16. März 1989; VDI Verlag GmbH, Düsseldorf 1989;

E15a: Statutory declaration of Mr Bremenfeld, VDI Verlag, 19 January 2000;

E15b: Statutory declaration of Mr Rodewyk, 21 January 2000.

III. The Opposition Division held that the subject-matter of claim 1 as granted was not novel having regard to prior art as disclosed in document E13 which represents prior art under Article 54(3) and 158 EPC.

IV. The appellant requested that the decision under appeal be set aside and the patent be maintained unamended or, as an auxiliary request, that the patent be maintained on the basis of claim 1 as filed with letter of 20 January 2000.

Oral proceedings were requested in case the Board of Appeal intended to uphold the decision of the Opposition Division.

V. Respondent I (opponent 02) requested that the appeal be dismissed because the subject-matter of claim 1 as granted was not novel in view of the prior art as disclosed in document E13 and also document E15. Furthermore, the subject-matter of the patent as granted and the subject-matter of claim 1 according to the auxiliary request did not involve an inventive step in view of the prior art as disclosed in documents E1, E3, E5 to E7, E9 and E15.

Respondent II (opponent 03) informed the Board that it maintained its opposition to the patent in suit. But it refrained from making any submissions.

In its letter of 20 January 2000, respondent I further requested that the Board should also decide on the question of inventive step.

With letter of 16 February 2000, respondent I withdrew its request for oral proceedings submitted earlier.

VI. Independent claims 1 and 5 as granted (main request) read as follows:

"1. Process for manufacturing a plastic crate by injection moulding, said crate having a bottom (1) and upright side walls (2 to 5), at least one of the side walls (4, 5) being provided near the top side with a handle (8, 9) bounded at the bottom side by a handle opening (10, 11), the handle (8, 9) having a substantially closed outer wall (12) which is integral with the remainder of the crate, the process comprising the steps of injecting a liquid plastic material into a mould cavity corresponding to the shape of the crate to be manufactured, until the mould cavity is substantially filled, cooling the injected plastic material, and opening the mould, **characterizing in that** a gas under pressure is injected into the stream of liquid plastic material for the formation of the handle (8, 9), in such a way that at least one cavity (13) is formed in said liquid material and that said material is blown against the wall of the mould cavity part for the handle, the gas pressure is maintained during the cooling of said material, and the gas pressure is released just before opening of the mould."

"5. Plastic crate manufactured by injection moulding having a bottom (1) and upright side walls (2 to 5), at least one of the side walls (4, 5) being provided near the top side with a handle (8, 9) bounded at the bottom side by a handle opening (10, 11), the handle (8, 9) having a substantially closed outer wall (12) which is integral with the remainder of the crate, **characterized**

in that the handle (8,9) is hollow, the wall (12) of the handle enclosing at least one cavity (13) which is connected to the environment by a bore (16; 17, 18) of relatively small size in the wall of the handle."

- VII. By communication of 26 November 1999, the Board noted in a preliminary non-binding opinion that the subject-matter of claim 1 as granted was novel with regard to prior art as disclosed in document E13, because the latter did not disclose at which moment the gas cavity is vented and thus at which moment the gas pressure is released.

Furthermore, as far as document E15 is concerned, it was noted that document E15 seemed to describe a process for manufacturing a car console rather than a crate comprising side walls provided near the top side with a handle as defined in claim 1. Moreover, it appeared that document E15 did not disclose, in combination, the features that the gas pressure is maintained during cooling and released just before opening of the mould.

- VIII. (i) With respect to novelty, the appellant argued essentially as follows:

Document E13 described a process for manufacturing a plastic crate. However, document E13 neither explicitly nor implicitly described the features of the characterizing part of claim 1. In particular, E13 neither disclosed that gas under pressure is injected into the stream of the liquid for the **formation of the handle**, nor that the gas pressure is maintained during the cooling of the material of the handle, nor at which moment the gas is vented.

Therefore, the subject matter of the patent in suit was novel.

(ii) With regard to the objection of lack of inventive step, the appellant brought forward, in particular in its submission of 1 March 1995, the following arguments:

The closest prior art had to be seen in document E1, which disclosed a crate having hollow handles.

Documents E5, E6, E7, E8 and E9 described injection moulding processes wherein gas under pressure is injected into liquid plastic material for the formation of cavities, hollow ribs etc. However, none of these documents disclosed a plastic crate having a bottom and upright side walls, wherein at least one of the side walls was provided near the top side with a handle bounded at the bottom side by a handle opening.

Furthermore, they did not indicate that the processes described therein might be used for forming a handle of a crate.

The person skilled in the art also would not apply the process described in these documents for the formation of a hollow handle. When manufacturing such a crate, specific attention had to be directed to the formation of the bottom and the handles, because these parts are the most heavily loaded parts of the crate. The injection of pressurized gas would not be regarded as suitable for forming the handle, because, inter alia, of the risk of forming weak spots, in particular in the area of weld lines, and insufficient wall thicknesses.

The appellant had surprisingly found that, with the process as claimed in claim 1, crates can be manufactured having relatively thin walls and one or more handles which are sufficiently strong to carry the weight of a full crate and which lie comfortably in the hand.

IX. (i) With respect to novelty, respondent I argued essentially as follows:

Although there would be a margin left as far as the duration of the maintenance of pressure is concerned, a person skilled in the art, would know that, in a process as described in document E13, the pressure had to be maintained until the plastic was solidified. Otherwise, form stability of the product could not be guaranteed. Furthermore, respondent I stated that the form, in general, cools down within a few seconds and, consequently, the pressure would be released just before opening of the mould.

In particular, it would be technically impossible to release the pressure at an earlier stage, i.e. when the plastic is still in liquid form, so that the venting openings will automatically be closed by material still in liquid form.

Respondent I mentioned two reasons for this: Firstly, the speed of the exiting gas, which, at the beginning, would be at a pressure of 200 bar, did not allow the liquid material to block the openings. Secondly, the adiabatic expansion of the exiting gas would lead to a reduction of the temperature and an accelerated solidification of the plastic material, especially in the area of the venting openings.

Therefore, the subject-matter of the patent in suit was not novel with respect to the disclosure of document E13.

Furthermore, the subject-matter of independent claims 1 and 5 as granted would be known from document E15 which disclosed a process for manufacturing a car console having the structure of a crate as defined in the claims of the patent in suit. As the only difference could be seen in the designation of the moulded article, the claimed subject-matter was not novel.

(ii) With respect to lack of inventive step, respondent I argued in the Notice of Opposition and his letter of 20 February 1996 essentially as follows:

A process for manufacturing an injection moulded article wherein a gas under pressure is injected into the liquid plastic material for the formation of a cavity was described, inter alia, in documents E8 and E9. In the known process, the liquid plastic material was blown against the wall of the mould cavity and, during the cooling of the material, the gas pressure was maintained. Finally, the gas pressure was released before opening of the mould.

Furthermore, it was known from documents E6 and E7 to apply the known process for the production of crate-like articles having a bottom and side walls and to provide cavities at the edge or rim portion (E7) of the moulded article.

Moreover, it was known from document E5 to produce handle-like structures by using the above-mentioned process.

Therefore, it would be obvious for the person skilled in the art, to apply the known process for the formation of a handle in a crate as defined in claim 1 of the patent in suit. Especially, as document E1 already describes a crate having a bottom and upright side walls, wherein at least one of the side walls is provided near the top side with a handle bounded at the bottom side by a handle opening.

Reasons for the Decision

Main Request

1. *Novelty*

1.1 Document E13 represents prior art according to Article 54(3) and 158 EPC as far as the designated states AT, BE, CH, DE, FR, GB, IT, LI, NL, and SE are concerned, for which the necessary fees have been paid.

The decision that document E13 represents prior art according to Art. 54(3) EPC is actually uncontested and not under appeal.

1.1.1 Document E13 describes a process for manufacturing a plastic crate wherein a cavity is formed, inter alia, in the part of the handle by injecting a gas under pressure into the stream of liquid plastic material for the formation of a cavity, inter alia, in the area of the handle.

Document E13 does not explicitly describe the features that

- (a) the material is blown against the wall of the mould cavity,
- (b) the gas pressure is maintained during cooling and
- (c) released just before opening of the mould.

The question to be answered is therefore whether these features are directly and unambiguously derivable from the disclosure of document E13.

- 1.1.2 Document E13 teaches injection of gas under pressure into the stream of liquid plastic from the side walls for forming a hollow channel which, in particular, extends through the handle, cf. page 2 last paragraph, page 7, lines 5 to 9, and Figure 6. The fact, that the hollow channel extends through the handle implies that according to document E13 the gas under pressure also is injected for the formation of the handle. The injection of gas under pressure (200 bar) into the liquid material results in the material being blown against the wall of mould cavity.

Thus, feature (a) is directly and unambiguously derivable from the teaching of document E13.

- 1.1.3 According to features (b) and (c) the gas pressure is **maintained during cooling** of the material and **released just before opening** of the mould. Features (b) and (c) are closely related and therefore have to be considered together.

(i) Document E13 further discloses that venting openings may be provided to allow a **controlled reduction** of the gas pressure. However, document E13

does not disclose at which moment the gas cavity is vented and thus at which moment the gas pressure is released.

There might be more than one possibility for timing the release of the pressure and the opening of the mould. It does not appear that there is a requirement that the gas pressure has to be maintained during cooling of the material and that the gas pressure can be released only just before opening of the mould.

Document E13 describes the possibility of retractable gas injection nozzles and a "self-closing" of the openings by still flowable material, cf. page 4, lines 26 to 30. According to document E13, such a procedure should allow the formation of **closed** hollow channels, i.e. hollow channels without any openings.

Consequently, there are two possibilities: either the gas pressure is maintained and not released, or the gas pressure is released before retracting the nozzles.

(ii) According to respondent I, none of the possibilities can be put in practice. However, respondent I does not consider a **controlled** release of the pressure, or the use of retractable gas injection nozzles, or the fact that the mould is cooled from outside and that the self-closing of the openings requires only an inner layer being in a flowable condition. Document E13 specifically teaches that the nozzles have to be retracted at the end of the flow process for the openings to be closed automatically.

(iii) Consequently, the person skilled in the art may take into consideration releasing the gas pressure

before the **whole** material is completely solidified and to control the release of the pressure in such a way that the holes of the gas injection and venting openings, if any, will be closed by material which is still in liquid state. In this case the gas pressure has not to be, and is probably not, released just before opening of the mould.

The person skilled in the art may also take into consideration maintaining the gas pressure until the whole material is completely solidified so that holes formed by the gas injection and/or venting means remain in the finished form as claimed in claim 5 of the patent in suit. In that case, the gas pressure may be released just before opening of the mould.

Thus, when carrying out the process as taught in E13 the person skilled in the art applies feature a), but may select the moment at which the gas pressure is released according to the circumstances and the desired design of the final product.

As a result, the features that the gas pressure is **maintained during cooling** of the material and **released just before opening** of the mould are not directly and unambiguously derivable from the teaching of document E13.

The subject matter of claim 1 as granted, therefore, is novel with regard to the disclosure of document E13.

(iv) The subject-matter of claim 5 is also novel with regard to the disclosure of document E13, because E13 does not describe a crate comprising a handle including a cavity which is connected to the environment by a

bore of relatively small size in the wall of the handle.

- 1.2 Respondent I further referred to document E15 also as being novelty-destroying for the subject-matter of claims 1 and 5 as granted. As can be seen from documents E15a and E15b, document E15 was made available to the public before the priority date of the patent in suit.

However, document E15 describes a process for manufacturing a car console. The stiffening element for the car console as shown in Figures 3, 14 and 15 is an open frame comprising crossbars at least one them being hollow, cf. page 59. The stiffening element of the car console shown in these drawings does not have the structure of a crate as defined in claims 1 and 5 of the patent in suit. In particular, the stiffening element does not have **a bottom and upright side walls and the side walls are not provided near the top side with a handle** bounded at the bottom side by a handle opening as defined in claim 1.

Therefore, the subject-matter of independent claims 1 and 5 of the patent in suit as granted is novel within the meaning of Article 54 EPC with regard to prior art as disclosed in the cited documents.

2. *Inventive step*

- 2.1 Document E1 is to be regarded as the closest prior art. It relates to a process for manufacturing a plastic crate as defined in the preamble of claim 1 as granted. The double-walled plastic crate may be fabricated by using the rotational moulding process or by means of

injection moulding of an expanded or foamed resin, cf. column 4, lines 5 to 14. The side walls include a handle grip opening.

- 2.2 The problem underlying the patent in suit is to be seen in that, on the one hand, the amount of material necessary for manufacturing the crate should be reduced and a light-weight, thin walled crate can be produced and, on the other hand, the handles should be sufficiently strong to carry the weight of the full crate and should lie comfortably in the hand, cf. column 1, lines 27 to 32 and 45 to 49.

The problem is solved by the process as defined in claim 1, especially by the features that gas under pressure is injected into the stream of liquid plastic material **for the formation of the handle**, and that the gas pressure is maintained during cooling and released **just before opening** of the mould. A crate thus produced comprises a handle including a cavity which is connected to the environment by a bore in the wall of the handle, which is the subject-matter of claim 5.

- 2.3 The process of injection moulding wherein a gas under pressure is injected into liquid plastic material for the formation of a cavity and wherein a positive pressure is maintained until the article is self-supporting is known from documents E3, E5 to E9 and E15.

The question to be answered is whether it was obvious for the person skilled in the art to use the process in the way defined in claim 1 for manufacturing a crate and, in particular, for the formation of the handle of the crate as defined in claim 1 of the patent in suit

as granted.

- 2.4 As pointed out by the appellant, specific attention had to be directed to the formation of the bottom and the handles when manufacturing a crate, because these are the most heavily loaded parts of the crate.

None of the cited documents relates to the problem of forming handles, in particular, none of them suggests the use of the above mentioned process for forming a hollow handle in order to solve the problems underlying the patent in suit as shown below:

- 2.4.1 Document E3 relates to an apparatus for injection moulding for use in producing hollowed articles or foamed articles with smoothened skin structure. The moulded articles are neither provided with handles nor does the document suggest that the process of gas injection may be suitable for forming specific parts of the article.
- 2.4.2 Document E5 describes a process for the production of moulded tubular structural web articles of higher flexural modules than obtainable for a foamed article of identical density. Such a tubular web article is quite different from a crate and it is not obvious for the person skilled in the art to take this document into consideration when looking for a solution for manufacturing crates, in particular for forming the handles of a crate.
- 2.4.3 Document E6 describes a process for injection moulding wherein fluid under pressure is injected into a stream of plastic material for the dual purpose of reducing the weight of the resultant moulding and the

application of an outward pressure on the plastics material urging it towards the mould surfaces until the surrounding wall of plastics material is self-supporting. The outward pressure assists the mould space to be filled and to give the moulding an improved surface finish. The cavities are formed in the interior of the walls of the moulded article.

Starting from document E1, the person skilled in the art may take the teaching of document E6 into consideration, because it gives a solution to the problem of reducing weight and also the quantity of plastic material.

However, it does not appear to be obvious for the person skilled in the art to try to reduce the weight of the moulding or to improve the surface finish by forming cavities in the area of the handle, because this is one of the most heavily loaded parts of the crate. E6 teaches that one or more of these cavities may be formed in any part of the moulding. Thus, the skilled person would select these parts of the crate which are less stressed in order to reduce the weight of the crate.

Thus, a combination of the teachings of E1 and E6 does not result in an obvious way in a process and a crate as claimed in claims 1 and 5, respectively, of the patent in suit as granted.

2.4.4 Effectively, document E7 refers to document E6 and points out that in the case of UK Patent Application No. 83112933, which is the priority document of E6, the area containing the resultant cavity may be relatively weak, cf. page 2, lines 60 to 70.

It is therefore suggested to form the cavities in areas of increased thickness. The thickened portions may be a rib or an edge or a rim portion.

Again, document E7 does not teach the formation of cavities in heavily loaded parts such as the handle of a crate. In particular, document E7 does not teach the injection of pressurized gas **for forming** a handle. According to E7, cf. page 1, lines 112 to 117, the ribs serve to strengthen the top and the walls of the moulding, and the flow of fluid is introduced to urge the plastics material toward the mould surfaces and to fill the thinner areas between the ribs, cf. page 1, lines 122 to 130.

2.4.5 Document E8 describes an injection moulding apparatus wherein fluid under pressure is injected into plastic material at one or more selected positions for forming cavities within the walls of the moulded article. Document E8 does not give any hints that the process described therein may be useful for forming the handle of a crate, and, in this respect, it does not go beyond the disclosure of the documents commented on above.

2.4.6 The same argument applies to document E9. Moreover, the process described in E9 differs from the claimed process in that the plastic material is introduced into the mould cavity sufficient to fill the mould cavity completely and, **subsequently, during the cooling of the resin**, pressurized gas is injected, cf. abstract. Thus the gas under pressure is not injected into a stream of liquid plastic material as claimed in claim 1 of the patent in suit as granted.

2.4.7 As already pointed out under point 1.2 above, document

E15 describes a process for manufacturing a car console. The stiffening element for the car console as shown in Figures 3, 14 and 15 has a structure different from that of the crate defined in claims 1 and 5 of the patent in suit. Document E15 does not suggest that the hollow crossbars, to which respondent I referred in particular, should have the function of a handle, and, in general, the stiffening element of the car console, as shown in E15, is a fixed element within the car. Document E8, therefore, does not give any hints that the process described therein may be useful for forming the handle of a crate.

- 2.5 It has further to be noted that none of the cited documents discloses explicitly that the gas pressure is maintained during cooling and released **just before opening** of the mould:

Documents E3 and E15 do not describe this part of the process in detail.

Document E5 only teaches that the pressure is maintained until the tubular article is self-supporting.

According to document E6, the pressure is maintained until the moulded part and the sprue have cooled and their surface skin is self-supporting; thereafter, the pressure is released in two steps. The feed chamber is refilled with plastics material and, **finally**, the clamping pressure on the mould is relieved and the mould opened to remove the moulding, cf. pages 9 and 10.

According to document E7, the pressure is maintained

until the plastics material is self-supporting. Subsequently, the pressure is relieved and the mould **can then** be opened, cf. page 1, lines 35 to 41.

According to documents E8 and E9, the pressure is maintained until the moulding can itself sustain the form dictated by the mould surface, and the pressure is released **before the mould is opened**, cf. E8, column 4 lines 13 to 17 and E9, column 4 lines 13 to 21.

Thus, none of these documents relates the moment at which the pressure is released with the moment of the opening of the mould in the way the patent in suit explicitly does.

- 2.6 To sum up it follows that, starting from document E1, there was no motivation for the person skilled in the art to use one of processes described in documents E3, E5 to E9 and E15 for the formation of the handle of a crate. These documents describe injection moulding processes wherein gas under pressure is injected into the liquid plastic material, however, none of the documents suggests that these processes may be used for forming a part of the crate, which is one of the most heavily loaded parts.

Moreover, any combination of the documents would not lead directly to the subject-matter of claim 1 as granted, because none of the documents teaches the step of releasing the pressure **just before** the opening of the mould.

In one of his arguments, respondent I started from documents E7, E8 and E9, respectively as closest prior art. However, bearing in mind that any hindsight should

be avoided, also from that starting point, there is no motivation for the person skilled in the art to provide the moulded articles described in these documents with a handle and a handle opening as defined in claims 1 and 5 of the patent in suit as granted.

3. Therefore, the subject-matter of independent claims 1 and 5 as granted is novel and involves an inventive step within the meaning of Articles 54 and 56 EPC. The dependent claims 2 to 4 and 6 to 8 define further embodiments of the invention according to the independent claims and likewise meet the requirements of the EPC.

Consequently, the grounds for opposition mentioned in Article 100 a EPC do not prejudice the maintenance of the patent in suit unamended.

4. Under these circumstances, the auxiliary request need not to be considered.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is maintained unamended.

The Registrar:

The Chairman:

A. Townend

A. Burkhart