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**Datasheet for the decision
of 10 January 2025**

Case Number: T 0354/23 - 3.3.09

Application Number: 17720352.8

Publication Number: 3448176

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A23L2/58, A23L2/60, A23D7/01,
A23L27/12

Language of the proceedings: EN

Title of invention:

METHOD FOR PRODUCING A CLEAR BEVERAGE

Patent Proprietor:

Cargill, Incorporated

Opponent:

Hammer, Jens

Headword:

Clear Beverage/CARGILL

Relevant legal provisions:

EPC Art. 54(3), 56, 83

Keyword:

Main Request: novelty, inventive step, sufficiency of disclosure - (yes)

Decisions cited:

Catchword:



Beschwerdekammern
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Case Number: T 0354/23 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 10 January 2025

Appellant: Hammer, Jens
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 8 December 2022
rejecting the opposition filed against European
patent No. 3448176 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman A. Haderlein
Members: A. Veronese
N. Obrovski

Summary of Facts and Submissions

- I. The appeal was filed by the opponent (appellant) against the opposition division's decision rejecting the opposition filed against the European patent.
- II. With its notice of opposition the opponent had requested that the patent be revoked in its entirety on the grounds under Article 100(a) EPC (lack of novelty and lack of inventive step) and Article 100(b) EPC.

III. Claim 1 of the opposed patent reads:

"1. A method for producing a clear beverage comprising the steps of:

(i) Providing an oil-in-water (O/W) emulsion comprising an n-alkenyl succinate starch and an essential oil, wherein the n-alkenyl succinate starch is in excess of said essential oil,

(ii) Producing a turbid beverage by diluting said O/W emulsion to reach a desired beverage concentration, and

(iii) Storing said turbid beverage at a temperature of above 30°C for a time sufficient to obtain a clear beverage."

IV. The documents submitted during the opposition proceedings included:

D1: WO 2016/077705 A1

D2: WO 2008/039564 A1

D3: S.S. Lim et al., Food Chemistry 128, 2011, 1023-8

- D4: E. Dłużewska et al., Acta Sci. Pol. Technol. Aliment. 5(2), 2006, 147-56
- D5: L. Dokić et al., Food Hydrocolloids 29, 2012, 185-92
- D6: B.C. Clark et al., "Acid-Catalyzed Reactions of Citrus Oils and other Terpene-Containing Flavors", Off-Flavors in Foods and Beverages, ed. G. Charalambous, Elsevier Science Publishers BV, 1992, 229-85

V. In its decision, the opposition division found essentially that:

- The claimed invention was sufficiently disclosed. The patent provided guidance for the skilled person to carry out the claimed method and to prepare a clear emulsion. It taught how to determine turbidity and what beverages could be considered clear according to the invention.
- The claimed subject-matter was novel over D1, a document belonging to the state of the art under Article 54(3) EPC which did not disclose the feature "storing said turbid beverage at a temperature of above 30°C".
- The claimed method involved an inventive step. D2, which disclosed the use of the emulsifier sodium octenyl succinate starch for preparing optically clear beverages, was the closest prior art. The claimed method differed from that of D2 in the storage step above 30°C and in the use of n-alkenyl succinate in excess to essential oil. The pasteurisation step of D2 was not a storage step. The underlying problem was to provide an alternative method for producing a clear beverage.

Neither D2 nor the other cited documents D3, D4 or D5 provided the pointer to use an amount of emulsifier exceeding that of the essential oil and/or to store the beverage above 30°C.

VI. In its reply to the statement setting out the grounds of appeal, the proprietor filed auxiliary requests 1 to 8. A renumbered copy of these requests was filed by letter dated 21 August 2023.

VII. The **opponent-appellant's** arguments are summarised as follows:

- The claimed invention was insufficiently disclosed. The patent did not disclose enough information to prepare the claimed clear beverage. Only lemon, lime, orange and grapefruit oil were used to prepare the emulsions exemplified in the patent. The highest oil concentration was 0.1% w/w. A beverage having the claimed turbidity could only be prepared by conducting tests based on trial and error.
- The claimed method was not novel over D1.
- The claimed method lacked an inventive step over D2, the closest prior art, alone or combined with D3, D4, D5 or D6. The claimed method differed from that disclosed in D2 only in that an n-alkenyl succinate was used in excess to the essential oil. Since these distinguishing features were not associated with any new effect, the problem was to provide an alternative method for producing a clear beverage. It was obvious to use n-alkenyl succinate in the claimed ratio with essential oil. D2 taught that the ratio between the surfactant and the oil

could be varied, and D3, D4 and D5 provided the incentive to use an excess of oil.

VIII. The **proprietor-respondent's** arguments are summarised as follows:

- The claimed invention was sufficiently disclosed. The appellant's assertions were not substantiated.
- The claimed method was novel over that of D1. D1 did not disclose the claimed storage step at a temperature above 30°C.
- The claimed method involved an inventive step over D2, alone or combined with D3, D4 or D5. The method allowed the preparation of clear beverages without the need for a long storage time. The problem was to provide a more efficient method for preparing a clear beverage. None of the cited documents provided the incentive to use an n-alkenyl succinate, let alone one in the claimed ratio with essential oil, nor the claimed storage step, to solve this problem. The same conclusions were reached when formulating the problem as being to provide an alternative clear beverage.

Requests

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

X. The respondent requested, as its main request, that the appeal be dismissed or, alternatively, that the patent be maintained on the basis of one of auxiliary requests 1 to 8 filed with its letter dated 21 August 2023.

Reasons for the Decision

Main request

1. *Sufficiency of disclosure*
 - 1.1 The appellant disputed the opposition division's finding that the claimed invention was sufficiently disclosed to be carried out by the skilled person.
 - 1.2 The appellant alleged that the examples shown in the opposed patent were not suitable to make it credible that the claimed invention could be carried out across the entire scope claimed.
 - 1.3 It argued that the patent did not disclose sufficient information to prepare a clear beverage according to the invention. Only lemon, lime, orange and grapefruit oil were used to prepare the emulsions exemplified in the patent. Furthermore, the highest oil concentration was 0.1% w/w. The skilled person would have had to carry out numerous tests to find the conditions required to prepare a beverage according to the invention. This involved an undue burden.
 - 1.4 The board does not agree. The claimed method involves simple steps, namely the preparation of an oil-in-water emulsion comprising n-alkenyl succinate starch and an oil in a certain ratio, dilution of the emulsion to obtain a beverage having the desired concentration and storage until the beverage is clear: see claim 1 and the description. The preparation of several emulsions according to the invention, comprising different types of essential oils, is described in the examples in paragraphs [0065] to [0074] of the patent.

1.5 The appellant has not provided any evidence that the skilled person would not have been able to prepare a clear beverage by relying on the teaching of the patent and common general knowledge at the filing date. In particular, it has not demonstrated that the claimed method cannot be carried out when using essential oils which differ from those used in the examples of the invention, let alone when using these oils at the concentrations which are usually present in beverages according to the invention.

1.6 This means that the appellant has only made unsubstantiated assertions, failing to establish serious doubts, based on verifiable facts, that the skilled person would be able to carry out the claimed method, or could only carry it out with an undue burden.

1.7 For these reasons, the claimed invention is sufficiently disclosed.

2. *Novelty*

2.1 The appellant disputed the opposition division's finding that the claimed subject-matter was novel over the teaching of D1, a document according to the state of the art under Article 54(3) EPC.

2.2 The board does not agree. D1, like the opposed patent, discloses a method for producing a clear beverage. The method comprises the steps of:

- a) preparing a pre-emulsion having an oil phase and an aqueous phase, the pre-emulsion comprising an n-alkenyl succinate starch emulsifier and an

essential oil, wherein the emulsifier is in an excess amount, compared with the essential oil; and

- b) homogenising the pre-emulsion to obtain an oil-in-water emulsion to be used in the clear beverage and, possibly, diluting the obtained emulsion;
- c) possibly, storing the emulsion for a quarantine period.

2.3 Reference is made in particular to the following passages of D1: page 2, last-but-one paragraph; passage bridging pages 3 and 4; page 14, second paragraph to page 15, last paragraph; page 16, third paragraph; and claims 1, 2, 3, 6, 9 and 10.

2.4 It was disputed whether D1 disclosed the step of storing the emulsion at a temperature above 30°C, which characterises claim 1. D1 teaches that the emulsion is stored at "ambient temperature" for a quarantine period of e.g. 15 days: page 16, third paragraph. However, D1 does not mention a temperature above 30°C.

2.5 Relying on D7, which it considered to represent common general knowledge, the appellant submitted that "ambient temperature" meant the surrounding temperature, and furthermore that this temperature depended on climatic conditions and could well be above 30°C. Thus, in its opinion, D1 disclosed the claimed method.

2.6 These arguments are not convincing.

2.7 In the first place, D1 does not define "ambient temperature" as a "surrounding temperature" above 30°C.

2.8 Furthermore, it is uncontested that the ambient temperature can change substantially depending on the geographical location and climatic conditions. It is also uncontested that there are places, such as Death Valley (USA), where the ambient temperature is typically above 30°C. However, D1 does not teach carrying out the method in such places. Hence D1 does not directly and unambiguously disclose the claimed method.

2.9 Therefore the claimed subject-matter is novel over the teaching of D1.

3. *Inventive step*

3.1 The opposed patent relates to a method for manufacturing a clear beverage comprising an emulsified essential oil and an excess of an n-alkenyl succinate starch emulsifier. The method envisages that an emulsion comprising these ingredients is prepared first. This emulsion is diluted to obtain a turbid beverage, which is then stored at a temperature above 30°C for a sufficient time to obtain a clear beverage.

3.2 The patent teaches that, by carrying out the claimed steps, the long storage times typically required to obtain clear emulsified beverages can be avoided.

3.3 The appellant argued that, contrary to the opposition division's finding, the claimed subject-matter did not involve an inventive step over D2, the closest prior art, alone or in combination with D3, D4 or D5. It also argued that the decrease in turbidity during storage was not surprising in view of the teaching of D6.

3.4 The board does not agree, for the following reasons.

Closest prior art

3.5 The parties did not contest the opposition division's finding that D2 is the closest prior art. D2, like the opposed patent, discloses a method for producing a clear beverage. The method involves, in a first step, the preparation of an oil-in-water emulsion by high-shear homogenisation of a mixture of an essential oil and a surfactant. This emulsion is diluted to obtain a beverage, which is then pasteurised: see paragraphs [0003], [0007], [0008], [0013] and the claims.

Pasteurisation clarifies the beverage and prevents spoilage induced by micro-organisms: paragraph [0013].

3.6 D2 focuses primarily on the preparation of beverages comprising a 2:1 ratio of an essential citrus oil, such as orange or lemon oil, and sucrose monopalmitate: see paragraphs [0014], [0015] and [0017], the examples and claims 1, 2 and 3. The only practical examples of the disclosed method are those for making the beverages of examples 1, 2 and 3. These contain a citrus oil (from orange or lemon) and sucrose palmitate in a 2:1 ratio.

3.7 As noted by the appellant, D2 suggests a long list of alternative surfactants for preparing the disclosed beverages. Among these surfactants, mention is made of sodium octenyl succinate starch, which is an n-alkenyl succinate starch: see the list in table 1 on pages 2 and 3, and in particular the last entry.

3.8 However, with the exception of sucrose monopalmitate, D2 does not describe even one beverage comprising the surfactants enumerated in this long list, let alone sodium octenyl succinate starch. Hence the beverages

disclosed in examples 1 to 3, which represent concrete and preferred forms of realisation of the disclosed invention, and which provide detailed information on how the beverages are manufactured, are the closest prior art and the most promising starting point for assessing inventive step.

Distinguishing features

3.9 The claimed method differs from that disclosed in the examples of D2 in that:

- n-alkenyl succinate starch is used as emulsifier
- an excess of emulsifier (n-alkenyl succinate) to essential oil is used to prepare the emulsion
- the turbid beverage is stored at a temperature above 30°C, for a time sufficient to obtain a clear beverage.

3.10 The appellant argued that, since n-octenyl succinate starch was mentioned in table 1 of D2, the use of an n-alkenyl succinate starch was not a distinguishing technical feature.

3.11 However, since n-octenyl succinate starch is not used to prepare the beverages exemplified in D2, which are the closest prior art, the use of an n-alkenyl succinate distinguishes the claimed method from that of D2.

4. The appellant also argued that the pasteurisation step described in D2 qualifies as a storage step at a temperature above 30°C according to claim 1. Thus, in

its opinion, the claimed storage step did not distinguish the claimed method from that of D2.

4.1 This argument is not convincing either. As decided by the opposition division, and reiterated by the respondent, pasteurisation cannot be considered a storage step. In the field of food processing, pasteurisation is a process of food preservation in which the temperature is raised quickly and for a short time, from room temperature to a substantially higher temperature which kills harmful microbes. Conversely, storage is a process for minimising the variability of a food, by keeping it under stable controlled conditions for a significant period of time.

4.2 Thus the skilled person would not consider the pasteurisation step described in D2, in which the emulsion is heated up to 85°C for 15 minutes and then cooled down, as a storage step above 30°C as defined in claim 1. As noted by the respondent, this is confirmed by D2 itself, which clearly distinguishes between pasteurisation and storage steps: see paragraphs [0013], [0018] and [0019].

Technical effect

4.3 The respondent stated that "the technical effect resulting from the distinguishing features was a method of producing a clear beverage which does not require a long storage time". In its opinion, this effect was demonstrated in table 6, which showed that a clear beverage could be obtained in 20.5 hours, instead of several days, typically used in the art, as explained in paragraph [0008] of the patent. Relying on this effect, the respondent argued that the underlying

objective technical problem was to provide a more efficient method for producing a clear beverage.

- 4.4 Conversely, the appellant argued that neither the use of an n-alkenyl succinate starch nor the storage step at more than 30°C was associated with a technical effect going beyond the teaching of D2. In fact, the beverages obtained by the method of D2, like those obtained by the claimed method, were already clear. Thus, as already concluded in point 5.2.6 of the decision under appeal, the underlying problem was to provide an alternative method for preparing a clear beverage.
- 4.5 The board agrees with the appellant. It notes that no comparison was made between the claimed method and that of the closest prior art. D2 teaches that the disclosed method, like the claimed one, produces a clear beverage, without the need for a storage step. In the case of D2, the final pasteurisation step ensures that the beverage becomes clear: see paragraphs [0013] and [0018]. D2 acknowledges that the beverages obtained by emulsifying essential oils are turbid, but also that they become clear when pasteurisation is carried out.
- 4.6 As submitted by the appellant, there is no evidence that the claimed method is "more efficient" than that of D2. It is credible that, as mentioned in paragraph [0008] of the patent, beverages were traditionally stored for several days at room temperature to achieve clarity. This means that both methods achieve the same effect, namely that they produce a clear beverage without the need for storing the initially obtained emulsion for a long time. The shortening of the storage period provided by earlier methods is achieved by different means: by storage above 30°C in the case of

the claimed method and by pasteurisation in the case of D2.

Underlying objective technical problem

- 4.7 Accordingly, as already held by the opposition division and maintained by the appellant, starting from D2 the underlying objective technical problem is not to provide a "more efficient method" for preparing a clear beverage. Rather, it is to provide an alternative method for producing a clear beverage.
- 4.8 The results of the tests shown in the tables on page 9 of the opposed patent make it credible that this problem has been solved. Clear emulsions are obtained in all tests by carrying out the claimed method.
- 4.9 The appellant submitted that the claims were too broad and that clear emulsions were only obtained after a storage period whose length was not specified in the claims. Hence the problem was not solved across the entire scope claimed.
- 4.10 This argument is not convincing. In the first place, the issue of whether the claimed method produces the claimed clear emulsion is one of sufficiency of disclosure, rather than of inventive step. As already established above, the requirement of sufficiency is met. Furthermore, claim 1 defines the length of the storage period in functional terms, stating that the composition is stored "for a time sufficient to obtain a clear beverage". This wording excludes storage periods unsuitable to produce a clear beverage.

Non-obviousness of the claimed solution

- 4.11 According to the appellant, the claimed solution did not involve an inventive step over the teaching of D2, alone or in combination with D3, D4 or D5.
- 4.12 In its opinion, it was clear from D2 that all the surfactants mentioned in table 1, including sodium octenyl succinate starch, could be used to carry out the invention described. Furthermore, although it only disclosed compositions comprising an excess of essential oil, D2 stated that the emulsifier-to-oil ratio had to be adjusted. By following this teaching, when confronted with the underlying technical problem, the skilled person would have prepared a beverage comprising an n-alkenyl succinate emulsifier in excess to the essential oil. The skilled person would also have carried out a storage step at above 30°C, because storage steps at this temperature were part of the common general knowledge in the field.
- 4.13 Furthermore, according to the appellant, D3, D4 and D5 provided an additional incentive to use an excess of emulsifier. The appellant noted essentially that:
- Figure 1 of D3 taught that the size of the droplets in orange-oil-in-water emulsions decreased when the amount of an emulsifier, a modified starch, was increased, and in particular when it was used in excess to oil; this was confirmed by figure 4.
 - D4 taught that the opacity of emulsions decreased during storage and increased if the volume fraction of the oil was raised: page 154 and table 2.

- D5 taught that an excess of n-octenyl succinate starch led to a decrease in the droplet size of emulsions: page 187, section "Disperse characteristics".

4.14 In its opinion, taking into account the teaching of these documents, when confronted with the problem of preparing a clear beverage, the skilled person would have increased the amount of surfactant, and used it in excess to the oil, in order to reduce the size of the oil particles contained in the beverage. For these reasons, the claimed invention lacked an inventive step over the teaching of D2, alone or in combination with that of D3, D4 or D5.

4.15 These arguments are not convincing either.

4.16 As noted by the respondent during the oral proceedings, D2 champions the use of sucrose monopalmitate for preparing beverages comprising citrus essential oils. Sucrose monopalmitate is the only emulsifier for which some practical technical information is provided, e.g. in terms of loading and ratio of essential oil to emulsifier. It is the only surfactant used to prepare the exemplified beverages. Furthermore, the only ratio between essential oil and sucrose monopalmitate mentioned is 2:1. This means that the oil is in large excess: see paragraphs [0015] and [0017] and the examples. This aligns with the idea of using a low amount of emulsifier advocated in paragraph [0008].

4.17 It is undisputed that, as noted by the appellant, D2 mentions the possibility of using other emulsifiers and adjusting the oil-to-emulsifier ratio. However:

- As stated in paragraphs [0002] to [0010] of the patent, at the filing date the production of clear beverages comprising emulsified essential oils was still challenging and required complex washing procedures to remove insoluble terpenes.
- The technical information presented in D2 concerning the use of surfactants other than sucrose monopalmitate is very limited.
- D2 consistently refers to a 2:1 essential-oil-to-emulsifier ratio, and this is the only ratio mentioned in this document.

4.18 Thus the board is of the opinion that even if the skilled person had decided to replace sucrose monopalmitate with n-octenyl succinate starch, they would not have found in D2 the incentive to increase significantly the surfactant-to-oil ratio, deviating considerably from the ratio disclosed in the examples of D2, which are the starting point for assessing inventive step.

4.19 Concerning the teaching of D3, D4 and D5, as noted by the respondent:

- D3 does not relate to the clarity of emulsions: the emulsions used in the experiments, including those in figure 1, cannot be clear, as the size of the particles is very large, i.e. more than 1 μm . As noted by the respondent, oil-in-water emulsions are clear only when their droplets have a size of less than 0.1 μm . As far as figure 4 of D3 is concerned, all the emulsions are opaque, and the results relate to the use of a polymer as a thickening agent, rather than an emulsifier.

- There is no continuous correlation between the concentration of substituted starch and droplet size in figure 1 of D3. This is evident, in particular, when comparing the results observed with compositions comprising an amount of modified starch of 4%, which is lower than the amount of oil used in the tests (5% wt.), with those observed with compositions comprising amounts of surfactant of 6% wt., 8% wt. and 10% wt., which are higher than the amount of oil. The resulting particle size is practically identical in all these tests.

- Irrespective of the emulsifier concentration used in the emulsions of figure 1 of D3, the size of the droplets increases progressively during storage; thus the skilled person would not have any incentive to increase the amount of emulsifier to prepare clear beverages.

- D4 relates to an investigation into the rheological properties, including viscosity and opacity, of oil-in-water emulsions comprising different emulsifiers, including modified starch; however, D4 focuses on the preparation of opaque beverages, which are more similar to natural juice, rather than clear emulsions (see page 154). On page 154 it also refers to earlier studies showing that opacity depends on oil droplet size and oil concentration; however, in this regard the overall teaching is confusing, because page 152 recites a contradictory statement that an increase in the oil-phase concentration from 20% to 40% in emulsions stabilised by modified starch did not cause any significant changes in particle-size distribution or in the average oil droplet size.

- D5 aims at investigating the influence of n-octenyl succinate starch on the stability and rheological properties of oil-in-water emulsions. On page 187 it shows that an increase in the concentration of n-octenyl succinate starch is accompanied by a decrease in the droplet size. However, like D4, D5 neither mentions clear emulsions nor aims at their production. The emulsions of D5 comprise droplets larger than 4 μm (see figure 1); thus, like those of D3, they cannot be clear. Furthermore, while figure 1 of D5 shows that an increase in the concentration of octenyl succinate starch is accompanied by a decrease in particle size, the amount of oil (20% and 40% wt.) is higher than that of the surfactant in all the tests.

- None of D2 to D5 refers to storage of the final beverage at a temperature above 30°C. In so far as D2 refers to a storage step, this step concerns the concentrate prepared in the first manufacturing step, not the final beverage: see paragraph [0019]. The other documents mention storage periods, but at a lower temperature, namely 20°C in D3 (page 1024, section 2.2) and D4 (page 149, fifth paragraph) and at "room temperature" in D5 (page 186, section 2.2.2). Thus these documents teach against rather than towards the claimed invention. The appellant has not provided any evidence that storage of beverages at more than 30°C was part of the common general knowledge at the relevant date either.

4.20 The appellant also referred to D6, arguing that this document provided an explanation of why opaque emulsions containing essential oils became clear during storage: insoluble limonene underwent acid-catalysed

reactions in acidic conditions. This process was independent of the type or amount of emulsifier used. Thus the observed decrease in turbidity was not surprising. This was an additional reason to consider the claimed method obvious.

4.21 This argument is not persuasive, at least because, as noted by the respondent, the conditions used in the acid-catalysed reaction of terpenes disclosed in D6 are extreme: pH 2.7 and 75°C. What is more, despite these harsh conditions, the reaction proceeds slowly, with a half-life of 200 days: third paragraph of D6.

4.22 Finally, in paragraph 5.4 of the statement setting out the grounds of appeal, the appellant argued that the claimed method was a straightforward modification of a "well known method". However, the appellant has not identified that "well known method", nor the features distinguishing the claimed method from that which was allegedly well known at the relevant date. No document disclosing that method as part of the common general knowledge at that date was cited either. Moreover, the appellant has not identified the "straightforward" modifications required to arrive at the claimed method, and why the skilled person would have considered making them.

4.23 For these reasons, the board considers that, starting from D2 and confronted with the underlying technical problem, the skilled person would not have:

- replaced the more preferred sucrose esters used as emulsifiers in the compositions of the examples of D2 with an n-alkenyl succinate, and certainly not with an amount of n-alkenyl succinate which is in excess of the essential oil. As already mentioned

above, D2 champions the use of an amount of emulsifier which is lower than that of oil: see paragraphs [0008], [0015] and [0017] and all the examples in D2. Hence D2 teaches against the claimed solution.

- stored the emulsified beverage at a temperature above 30°C, in order to obtain clarification. Reading D2, the skilled person would have considered pasteurisation important to achieve clarification and would have had no reason to store the beverage at 30°C, as required by claim 1.

4.24 Accordingly, the board is of the opinion that, as already decided by the opposition division, the method of claim 1 involves an inventive step over D2, alone or in combination with the teaching of D3, D4 or D5, whether or not the teaching of D6 and the common general knowledge are taken into account.

4.25 Accordingly, the subject-matter of claim 1, and that of the dependent claims, which are narrower in scope, involves an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



K. Götz-Wein

A. Haderlein

Decision electronically authenticated