BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Publication in the Official Journal Yes / No

File Number: T 54/89 - 3.3.2

Application No.: 84 101 186.9

Publication No.: 0 124 685

Title of invention: Treating beer to prevent chill haze and metal contamination.

Classification: C12H 1/04

D E C I S I O N
of 6 August 1991

Applicant: PQ Corporation

Headword: Beer treatment/PQ CORPORATION

EPC Article 56

Keyword: "Inventive step (yes) - non-obvious substitution"

Headnote

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 54/89 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal - 3.3.2
of 6 August 1991

Appellant : PQ Corporation
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Decision under appeal : Decision of Examining Division Patent Office dated 31 August 1988 refusing European patent application No. 84 101 186.9 pursuant to Article 97(1) EPC.

Composition of the Board :

Chairman : P.A.M. Lançon
Members : M.M. Eberhard
R.L.J. Schulte

Summary of Facts and Submissions

I. European patent application No. 84 101 186.9 (publication No. 0 124 685) was refused by a decision of the Examining Division. The decision was based on eleven claims submitted on 19 August 1988.

II. The ground for refusal was that the composition and the method of Claims 1 and 6 did not involve an inventive step in the light of the disclosure in DE-A-20 20 294, document (1), BE-A-647 680, document (2), and Hough et al "Malting and Brewing Science", 1971, pp. 632 and ff. document (3).

According to the decision, the problem underlying the application was to prevent chill haze in beer while averting metal contamination. It was held that documents (2) and (3) acknowledged the same problem of chill haze formation and that documents (1) and (2) disclosed the control of chill formation by addition of magnesium silicate exhibiting at least some of the parameters considered as essential in the application. In the Opposition Division's view, it was obvious for the skilled man to replace the magnesium silicate used in (1) or (2) by some other magnesium silicates such as "BRITESORB" or "MAGNESOL" known as good agents for the control of beer haze. The Opposition Division considered that the alleged action of these products on the beer soluble iron was only a possible interpretation of the whole mechanism of haze formation. As this interpretation was already suggested in (2) surprising properties of the claimed products in relation with the suppression of haze were not credible. The Appellant's arguments concerning iron contamination were regarded as not relevant since the expressions "while averting metal contamination" in the claims subordinated any prevention of metal contamination to the control of chill. It was concluded that as this action was already

known from (2) and (3), the alleged action on the soluble iron content could not involve any inventive step either.

III. The Applicant lodged an appeal against this decision.

IV. Oral proceedings were held on 6 August 1991. In the course of these proceedings, a new set of five claims was submitted as a single request. Independent Claim 1 reads as follows:

"A composition for treating beer to prevent chill haze while averting metal contamination of the beer, said composition comprising an inorganic silica containing chill-proofing agent and a magnesium silicate, characterized in that the composition consists of a porous, amorphous magnesium silicate having the following properties:

Properties of Magnesium Silicate

Mole Ratio $MgO:SiO_2$	1:1.6 to 4.7
Surface Area (m^2/g)	30 to 600
Bulk Density Tamped (g/cm^3)	0.25 to 0.75
Weight loss 105°C (wt %)	5 to 20
Ignition loss (wt %)	10 to 35
pH 5% wt in water	8.5 to 10.5

and a silica hydrogel with a surface area of at least 700 m^2/g, a mean pore diameter of 30 to 120 A, an average particle size of 20 microns or less, and a loss on ignition of more than 50%, 0.2 to 6 pbw (parts by weight) of magnesium silicate being present for each 100 pbw of chill-proofing agent."

Independent Claim 4 is directed to a method of treating beer comprising the step of contacting beer with the composition of Claims 1 to 3.

V. The arguments presented by the Appellant in his written submissions and during oral proceedings can be summarised as follows:

The Appellant stressed that in documents (2) and (3) the problem of preventing chill haze formation had been acknowledged, however both documents were silent about the problem how to avoid contamination of the beer caused by metals and especially by iron. The teaching of (3) concerned the composition of the haze and this document mentioned neither from where the iron came nor its detrimental effect on the beer. It was further argued that according to (1) the impurities of the silica hydrogel were washed out with water having preferably an acid pH-value. Therefore this washing removed metal salts from the silica hydrogel.

The Appellant confirmed at the oral proceedings that under these circumstances the silica gel did not cause any substantial contamination of the beer and that the claimed subject-matter could be considered as an alternative way for solving the two partial problems of preventing chill haze formation and averting metal contamination.

In the Appellant's view, (1) would have led the skilled person away from the invention since it taught that the metal contaminants had to be removed from the silica hydrogel if the mixture was used for treating beer. This teaching suggested that magnesium silicate could not even control the small amount of metal contamination introduced with a silica hydrogel still containing metal contaminants. According to the invention the magnesium silicate could avert the metal contamination introduced by

the silica hydrogel and washing to purify the latter was not required.

The Appellant further pointed out that in contrast to the composition of example 2 of document (1), the claimed composition consisted of a specific silica hydrogel and a specific magnesium silicate which were merely mixed without any additive and it was not obvious that such a composition would provide the desired result.

VI. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of Claims 1 to 5 filed during oral proceedings and a description to be adapted.

Reasons for the decision

1. The appeal is admissible.

2. There are no objections under Article 123(2) to the amended claims. Claim 1 is based upon the combination of features recited in Claims 1 and 2 as originally filed and upon the features stated at p. 3 of the original description (cf. p. 3, lines 12-16). It is further unambiguously derivable from the examples of the application as filed that the composition consists of two components, i.e. the silica hydrogel and the magnesium silicate. Claims 2 to 5 are supported by the original Claims 3 to 11.

3. The refused application relates to a composition for treating beer to prevent chill haze while averting metal contamination of the beer, this composition comprising an inorganic silica containing chill-proofing agent and a magnesium silicate.

Document (1) is considered as representing the closest prior art. It discloses porous compositions suitable for adsorbing proteins from beverages, in particular for preventing chill haze formation in beer, which comprise a mixture of silica gel and magnesium silicate (cf. Claim 1; p. 3, examples 2 and 3; p. 5). These compositions are prepared by kneading a mixture comprising a silica hydrogel and a hydrated silicate with cations having the valence 2 or 3, for example a hydrated magnesium silicate, preferably in the presence of boric acid or a borate and then drying the mixture. The starting silica hydrogel is washed with water at a pH-value between 0.5-8.5 in order to remove its soluble impurities (cf. Claim 1 and p. 2, third paragraph).

The Appellant has stressed that the washing of the silica hydrogel with water at acid pH-values removes the soluble metal salts therefrom and that, consequently, there is no substantial iron contamination of the beer by the silica gel contained in the composition. Furthermore, the composition of (1) is suitable for preventing chill haze formation in beer.

In the light of this prior art, the problem underlying the application can be seen in providing an alternative composition for preventing chill haze and metal contamination, which does not require the use of a metal free silica gel.

It is proposed to solve this problem by a composition consisting of a silica hydrogel and a porous amorphous magnesium silicate, which exhibit the characteristics defined in Claim 1, the amount of magnesium silicate being 0.2 to 6 parts by weight (pbw) per 100 pbw of silica hydrogel. In view of the examples of the application which

show that the claimed composition prevents chill haze and is effective in reducing the beer-soluble metal content, especially iron, introduced by the silica hydrogel, the Board is satisfied that the technical problem has been plausibly solved.

4. Novelty of the composition was not disputed by the Examining Division. Furthermore, the present Claim 1 contains additional limiting features in comparison to Claim 1 upon which the decision was based.

After examination of the cited documents the Board has come to the conclusion that none of these documents discloses a composition for treating beer, which consists of a silica hydrogel and a porous amorphous magnesium silicate having respectively the characteristics defined in the present Claim 1. Therefore the claimed subject-matter is considered to be novel.

5. It still remains to be examined whether the requirement of inventive step is met by the claimed composition.

5.1 The purpose of document (1) is to provide a composition which is specifically suitable for the adsorption of proteins from a liquid phase and does not exhibit the swelling properties of bentonite. This aim is achieved by a composition prepared as already indicated above and which contains a silica gel and a magnesium silicate. The hydrated magnesium silicate used as starting material in examples 2 and 3 has a mole ratio $MgO:SiO_2$ of 1:1.33, however document (1) indicates neither the additional characteristics of this silicate nor its method of preparation nor the characteristics of the magnesium silicate contained in the final composition. This composition is effective for adsorbing proteins from beer

and for preventing chill haze formation therein (cf. p. 2, second and third paragraphs; whole p. 5). Document (1) does not deal with the problem of metal contamination by the beer-soluble iron possibly present in the composition nor does it expressly mention the risk of such a contamination. It is indeed required that the starting hydrogel be freed from its soluble impurities, however this requirement is not expressly connected with the necessity of avoiding metal contamination of the beer. The Board cannot find any information in document (1) as to how iron contamination of the beer could be averted or reduced if the washing step of the starting silica hydrogel was left out or, in other words, if a silica hydrogel containing small amounts of beer-soluble iron were used. Taking into account that according to (1) purification of the starting silica hydrogel is necessary, the skilled person would not infer therefrom that magnesium silicate might avert iron contamination of the beer caused by a silica hydrogel containing beer-soluble iron. Therefore the teaching of document (1) would not encourage the skilled person to replace the magnesium silicate used in the compositions of (1) by another known magnesium silicate having the characteristics defined in Claim 1, in order to solve the problem stated above.

5.2 Document (2) discloses that certain silicates, in particular calcium silicate, magnesium silicate or zinc silicate improve the stability of packaged beer without impairing foaming and taste (cf. p. 4, last paragraph). According to this document permanent haze and chill haze are primarily due to complexes of protein and tannin, through hydrogen bonding, and are promoted by the presence of metals and oxidation (cf. p. 4, lines 10 to 15). The magnesium silicate is preferably added to the beer prior or during filtration and provides stability of the beer by

removal of the anthocyanogens (cf. p. 6, lines 15 to 24 and p. 7, lines 14 to 19). Therefore this document clearly teaches that chill haze formation is avoided owing to the magnesium silicate acting as an adsorbent for the anthocyanogens. However it is not derivable therefrom that the magnesium silicate would also remove the beer-soluble iron or metals.

According to p. 5 (referred to in the decision under appeal) the silicates disclosed in (2) do not affect the foaming qualities and taste of the beer. It is assumed that this may be in part due to the fact that their content of soluble heavy metal oxides is lower than in the normally used montmorillonite clays which contain, for example, more iron oxide (cf. p. 5, last paragraph). Thus according to this passage, contamination by beer-soluble iron introduced with montmorillonite clays may be reduced by replacing this chill haze preventive by Mg, Ca, or Zn silicates having a lower iron content. In the Board's view, this teaching does not suggest that a particular magnesium silicate having specific physico-chemical data would be capable of adsorbing or removing from the beer the beer-soluble iron introduced with a chill haze preventive. Therefore this document does not point at the claimed solution even in combination with the teaching of (1).

5.3 According to document (3) haze is formed by aggregation of polymerized polyphenols and proteins (cf. p. 635, last paragraph). At p. 633 cited in the decision under appeal, the composition of hazes is discussed. It is disclosed that hazes contain metallic ions and glucose in addition to proteins and polyphenols and that in particular copper, iron and aluminium are concentrated by a factor of 4000-80,000 in hazes as compared with the residual beer. Of the metal present in haze, copper and iron appear to be the

most significant in view of their activity as oxidation catalysts (cf. p. 633, lines 2 to 8 and 17 to 18). The skilled person would deduce from this teaching that the content of iron or copper in the beer might be reduced by formation of a haze, in particular a chill haze, and filtration. However this represents another way of reducing the iron content of the beer, which is very different from the claimed solution since this latter is based on the treatment of beer with a specific composition of adsorbents. Furthermore as (3) does not even mention the use of magnesium silicate as adsorbent for treating beer in order to prevent chill haze, it cannot give a hint at the claimed solution, either considered separately or in combination with (1) and/or (2).

5.4 It is pointed out in the decision under appeal that magnesium silicates such as BRITESORB (R) or MAGNESOL (R) are known as good agents for "improving control of beer haze". Although no document is cited to support this allegation, the file includes a copy of page 149 of "The Condensed Chemical Dictionary", G. Hawley, 10th Edition, 1981. It is known therefrom that "BriteSorb" is a trademark for a synthetic, precipitated magnesium silicate having the empirical formula $MgO \cdot 2.5\ SiO_2 \cdot 1.5\ H_2O$, a large surface area and a pH of 9.5 in a 10% slurry. This dictionary gives several possible uses of this product, namely purification, clarification, adsorption and catalyst base. Treatment of beer to prevent haze formation is not mentioned. It is not clear whether this product exhibits the physico-chemical data defined in Claim 1 since the examples of the application involve the use of a particular BRITESORB, namely BRITESORB 90. Moreover, this document does not disclose that the control of beer haze can be improved by using "BRITESORB" as adsorbent. Under these circumstances and in the absence of documents supporting the Examining Division's allegation, the Board

cannot follow its arguments that the skilled person would be prompted to replace the magnesium silicate of document (1) by a known magnesium silicate such as "BRITESORB" in order to improve control of beer haze.

5.5 For the preceding reasons, the Board considers that it was not obvious in the light of the cited prior art to replace the magnesium silicate of the composition according to (1) by another magnesium silicate exhibiting the combination of properties recited in Claim 1 in order to solve the problem defined above. Under these circumstances, it is not necessary to further examine whether the additional features stated in the characterising part of Claim 1 involve an inventive step.

It results from the preceding that the composition of Claim 1 meets the requirement of inventive step set out in Articles 52(1) and 56.

6. The reasons given above apply analogously to Claim 4 which is directed to a process of treating beer to prevent chill haze while averting metal contamination and which comprises the step of contacting the beer with the composition of Claims 1 to 3.

Dependent Claims 2, 3 and 5 which relate to preferred embodiments of Claims 1 and 4 derive their patentability from that of Claims 1 and 4.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division with the order to grant a patent on the basis of Claims 1 to 5 filed during oral proceedings and a description to be adapted.

The Registrar | The Chairman

P. Martorana | P. Lançon