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**Datasheet for the decision
of 29 October 2010**

Case Number: T 1358/07 - 3.3.01

Application Number: 98908886.9

Publication Number: 0983242

IPC: C07D 213/89

Language of the proceedings: EN

Title of invention:

Method for producing particles of pyriithione salts

Applicant:

Arch Chemicals, Inc.

Opponent:

-

Headword:

Submicron-sized particle production/ARCH

Relevant legal provisions:

EPC Art. 123(2), 83

Keyword:

"Main and first auxiliary request: amendments (not allowable)"
"All requests: sufficiency of disclosure (no) - undue burden;
reactor defined by a result to be achieved - no sufficient
information to enable the skilled person to identify or design
a suitably configured reactor to achieve the desired result
without undue burden"

Decisions cited:

T 0435/91, T 0910/06

Catchword:

-



Case Number: T 1358/07 - 3.3.01

D E C I S I O N
of the Technical Board of Appeal 3.3.01
of 29 October 2010

Appellant: Arch Chemicals, Inc.
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 26 January 2007
refusing European patent application
No. 98908886.9 pursuant to Article 97(1) EPC
1973.

Composition of the Board:

Chairman: P. Ranguis
Members: G. Seufert
L. Bühler

Summary of Facts and Submissions

I. The Appellant lodged an appeal against the decision of the Examining Division dated 26 January 2007 refusing the European patent application No. 98908886.9.

II. In this decision the following numbering will be used to refer to the documents:

(3) EP 0 173 259 A2

(4) English Translation of the Japanese patent application number 58-122846

(5) Biocompare; M-140K Laboratory Microfluidiser® Processor from Microfluidics

(5a) Microfluidics: Product information data

(6) Brochure of for High-Pressure Pumps and Homogenizers produced by Niro Inc.

III. The decision under appeal was based on the set of claims filed with letter of 22 June 2004, independent claims 1 and 15 reading as follows:

"1. A method for producing submicron-sized particles of polyvalent metal salts of pyrithione, characterised by reacting pyrithione or a water-soluble salt of pyrithione and a water-soluble polyvalent metal salt in a pressurised turbulent flow reactor that generates pulverizing forces."

"15. A method for producing submicron-sized particles of zinc pyrithione, characterized by reacting a pyrithione or a water-soluble salt of pyrithione and a water-soluble zinc salt selected from the group consisting of zinc sulfite, zinc chloride, zinc

acetate, and combinations thereof, in a turbulent flow reactor generating pulverizing forces, said turbulent flow reactor maintained at a pressure of from about 18,000 psi to about 23,000 psi and a temperature of from about 0°C to about 23°C."

The Examining Division relying on document (3), which disclosed the preparation of fine particles of zinc pyrithione in the presence of a particular amino compound, held that the claimed subject-matter did not involve an inventive step. In particular, the Examining Division considered that the turbulent flow reactor that created the pulverizing forces was not necessary to achieve the desired result and no unexpected effects related to the reactor were apparent.

- IV. In the statement setting out the grounds of appeal the Appellant defended the set of claims underlying the decision under appeal.
- V. With letter dated 6 August 2007 the Appellant filed document (4).
- VI. In a communication accompanying the summons to oral proceedings the Board expressed its preliminary opinion. In particular, the Board raised an objection under Article 123(2) EPC against independent claims 1 and 15. Furthermore, it considered that the invention was not sufficiently disclosed for the skilled person to be able to carry it out in its whole extent. Further issues were clarity and inventive step.
- VII. In reply to the Board's communication the Appellant filed a first, second and third auxiliary request.

Independent claims 1 and 13 of the first auxiliary request read as follows:

"1. A method for producing submicron-sized particles of polyvalent metal salts of pyrithione, characterised by reacting pyrithione or a water-soluble salt of pyrithione and a water-soluble polyvalent metal salt in a pressurised turbulent flow reactor that generates pulverising forces at a pressure of 18,000 psi to 50,000 psi (124,092kPa to 344,700kPa) and a temperature of 0°C to 23°C, said reaction producing submicron sized particles of pyrithione salt."

"13. The method for producing submicron-sized particles of zinc pyrithione, characterised by reacting a pyrithione or a water-soluble salt of pyrithione and a water-soluble zinc salt selected from the group consisting of zinc sulfate, zinc chloride, zinc acetate, and combinations thereof, in a turbulent flow reactor generating pulverising forces, said turbulent flow reactor maintained at a pressure of from about 18,000 psi to 23,000 psi (124,092kPa to 158,563kPa) and a temperature of from about 0°C to 23°C, said reaction producing submicron sized particles of zinc pyrithione."

The second auxiliary request is distinguished from the first auxiliary request in that the pressure in claim 1 is limited to *"18,000 psi to 23,000 psi (124,092kPa to 158,562kPa)"*.

Independent claims 1 and 13 of the third auxiliary request read as follows:

"1. A method for producing submicron-sized particles of polyvalent metal salts of pyrithione, characterised by reacting pyrithione or a water-soluble salt of pyrithione and a water-soluble polyvalent metal salt in a pressurised turbulent flow reactor that generates pulverising forces at a pressure of 18,000 psi to 23,000 psi (124,092kPa to 158,562kPa) and a temperature of 0°C to 23°C, said reaction producing submicron sized particles of pyrithione salt, wherein said pressurised turbulent flow reactor comprises:

(i) Baffles placed within said pressurised turbulent flow reactor to perturb the laminar flow of the reactants as they flow through the reactor; or

(ii) A fixed geometry interaction chamber which divides the pressurised reaction mixture into plurality of streams which are then brought together in the reactor to generate said pulverising forces."

"13. The method for producing submicron-sized particles of zinc pyrithione, characterised by reacting a pyrithione or a water-soluble salt of pyrithione and a water-soluble zinc salt selected from the group consisting of zinc sulfate, zinc chloride, zinc acetate, and combinations thereof, in a turbulent flow reactor generating pulverising forces, said turbulent flow reactor maintained at a pressure of from about 18,000 psi to 23,000 psi (124,092kPa to 158,563kPa) and a temperature of from about 0°C to 23°C, said reaction producing submicron sized particles of zinc pyrithione, wherein said pressurised turbulent flow reactor comprises:

(i) *Baffles placed within said pressurised turbulent flow reactor to perturb the laminar flow of the reactants as they flow through the reactor; or*

(ii) *A fixed geometry interaction chamber which divides the pressurised reaction mixture into plurality of streams which are then brought together in the reactor to generate said pulverising forces."*

VIII. In reply to a further communication of the Board, in which the Appellant was informed that documents (5) and (5a) relating to product information of the Laboratory Microfluidiser M-140K, which has been used in the patent application, might be considered during oral proceedings, the Appellant filed a fourth request and document (6).

The fourth auxiliary request is distinguished from the third auxiliary request in that the feature "*Baffles placed within said pressurised turbulent flow reactor to perturb the laminar flow of the reactants as they flow through the reactor*" has been removed from both independent claims 1 and 13.

IX. At the oral proceedings before the Board, held on 29 October 2010, the Appellant submitted a fifth auxiliary request. Its only independent claim is identical to claim 13 of the fourth auxiliary request reading as follows:

"1. The method for producing submicron-sized particles of zinc pyrithione, characterised by reacting a pyrithione or a water-soluble salt of pyrithione and a water-soluble zinc salt selected from the group consisting of zinc sulfate, zinc chloride, zinc

acetate, and combinations thereof, in a turbulent flow reactor generating pulverising forces, said turbulent flow reactor maintained at a pressure of from about 18,000 psi to 23,000 psi (124,092kPa to 158,563kPa) and a temperature of from about 0°C to 23°C, said reaction producing submicron sized particles of zinc pyrithione, wherein said pressurised turbulent flow reactor comprises:

a fixed geometry interaction chamber which divides the pressurised reaction mixture into plurality of streams which are then brought together in the reactor to generate said pulverising forces."

- X. The arguments of the Appellant as provided in writing and during oral proceedings, to the extent that they are relevant for the present decision, can be summarized as follows:

- Article 123(2) EPC

The main request complied with Article 123(2) EPC. Claims 1 and 15 referred to a method for producing submicron-sized particles. Accordingly, the deletion of expression "said reaction producing submicron particles of pyrithione salts" did not change their meaning.

The amendments in claim 1 of the first auxiliary request were supported by page 20, lines 3-5 and page 22, lines 7-10. Support for their combination could be found in claim 17 as originally filed. The importance of the pressure and temperature were further apparent from page 21, lines 19-21 and the examples.

- *Article 83 EPC*

The patent application provided sufficient information for the skilled person to carry out the invention. The patent application clearly indicated the importance of high pressure and turbulence. Furthermore, the types of pulverising forces generated by the high pressure turbulent flow reactor were clearly identified. The phenomenon turbulence, the laws governing it and the means of creating it were part of the common general knowledge of the skilled person. Furthermore, the patent application clearly disclosed such means, for example baffles or a fixed geometry interaction chamber dividing the reaction mixture into multiple streams and bringing them back together. A commercially available reactor to successfully carry out the process was clearly identified in the patent application. This reactor had been used in the examples and it is apparent from the results on page 25 that submicron-sized particles are produced. Furthermore, other suitable reactors were available as can be seen from document (6).

The subject-matter of the first auxiliary request was limited to a specific pressure and temperature range to reflect the conditions which have been demonstrated to produce submicron-sized particles.

Furthermore, additional physical features providing the necessary forces have been introduced into the claim 1 of the third, fourth and fifth auxiliary request. The fixed geometry interaction chamber thereby reflected the specific microfluidiser, which was disclosed in the patent application and was used in the examples.

XI. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request filed with letter of 22 June 2004, or alternatively on the basis of one of the first to third auxiliary requests submitted with letter of 8 October 2010, fourth auxiliary request submitted with letter of 28 October 2010 or fifth auxiliary request submitted during oral proceedings on 29 October 2010.

XII. At the end of the oral proceedings the decision under appeal was announced.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Amendments*

2.1 Independent claims 1 and 15 of the main request are based on claims 1 and 17 as originally filed, which have been modified by deleting the expression "said reaction producing submicron-sized particles of pyrithione salt".

2.2 The Appellant argued that by referring to a method for the production of submicron-sized particles, the deletion of this expression did not change the meaning of the claims.

2.3 The Board does not share this point of view.

The deleted expression indicated a functional relationship between the particle size and the reaction, namely that the reaction has to be carried out in such a way that submicron-sized particles are obtained. Hence, it is not without a technical meaning. Removing the expression from the independent claims 1 and 15 changes their meaning insofar as the submicron-sized particles may no longer solely be obtained by the reaction, but may be produced with the help of additional means, for example a subsequent milling step. Such processes are not supported by the application as originally filed.

2.4 Hence, the amendments made to claims 1 and 15 of the main request represent subject-matter which is not clearly and unambiguously derivable from the application as filed, contrary to requirements of Article 123(2) EPC. Consequently, the Appellant's main request is refused.

First auxiliary request

3. *Amendments*

3.1 Claim 1 of the first auxiliary request is based on claim 1 as originally filed, which has been amended by introducing two new features, namely a specific pressure and a specific temperature range.

3.2 According to the Appellant support for these features can be found on page 20, lines 2-4 and page 22, lines 7-10 of the description as filed. Support for

their combination could be found in claim 17 as originally filed. The Appellant further argued that the amendments have been made to clarify the required reaction conditions as can be seen from page 21, lines 19-20 and the examples.

Furthermore, the Appellant referred to the decision T 910/06 to be considered as argument in favour for the amendments made in claims 1 and 13 of the first auxiliary request.

- 3.3 It is not disputed that support for each of these features can be found independently in the patent application as originally filed. However, neither the passage on page 20, lines 2-4, referring to various pressure ranges, nor the passage on page 22, lines 7-10, referring to the various temperature ranges, provides support for the combination of the specific pressure range of 18,000 psi to 50,000 psi with the specific temperature range of 0°C to 23°C. This combination is also not supported by claim 17 as originally filed as this claim refers to the preparation of submicron-sized particles of a particular pyrrithione salt at a pressure of 18,000 psi to 23,000 psi and a temperature of 0°C to 23°C. Neither can the Appellant's reference to the passage on page 21 or the examples be considered as clear and unambiguous support for the claimed combination. The passage on page 21 merely refers to the influence the pressure has on the particles size. The temperature is not mentioned. The examples merely describe two specific combinations of pressure and temperature using a specific reactor and cannot, therefore, support the combination of the claimed ranges with the generally defined process of claim 1.

The decision T 910/06 cannot support the Appellant's case either. In this decision claim 1 of the main request has been amended by introducing subject-matter derived from a dependent claim referring to certain formulae. Claim 1 was further amended by restricting the definition of certain variables in the formulae. The question to be examined in T 910/06 was therefore whether or not the limitation in the definition of these variables created novel subject-matter. This situation cannot be compared to the present situation concerned with the combination of two independent features.

- 3.4 In conclusion, the subject-matter of claims 1 and 13 of the first auxiliary request is not clearly and unambiguously disclosed in the application as filed, contrary to the requirements of Article 123(2) EPC.

4. *Sufficiency of disclosure*

At oral proceedings the issue of sufficiency of disclosure was also discussed for the first auxiliary request and the Board came to the conclusion that this request did not comply with the requirements of Article 83 EPC. However, in view of the negative conclusion with regard to the compliance with Article 123(2) EPC the Board sees no reason to go here into more detail in this respect. The Appellant's arguments and Board's considerations are fully applicable to the second auxiliary request, which is almost identical to the first auxiliary request (see point VII above).

Second auxiliary request

5. *Amendments*

In view of the negative outcome with respect to sufficiency of disclosure, the Board can limit itself to the consideration of this requirement

6. *Sufficiency of disclosure*

6.1 Article 83 EPC requires that the European patent application shall disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

It is the established jurisprudence of the Boards of Appeal that an invention is sufficiently disclosed, if it can be performed by a person skilled in the art without undue burden **in the whole area claimed**, using common general knowledge and taking into account further information given in the description of the patent or patent application. This principle applies to any invention irrespective of whether the invention is characterised by structural or functional features (T 435/91, OJ EPO 1995, 188, point 2.2.1).

6.2 The present patent application is concerned with the preparation of submicron-sized particles of polyvalent metal salts of pyrithione. According to the invention, the means provided to achieve this goal is to carry out the reaction resulting in the formation of the polyvalent metal salt of pyrithione in a highly pressurised turbulent flow reactor generating "pulverising forces" (patent application, page 19,

lines 1-8). Pulverising forces are defined as those forces which affect particles size reduction under turbulent flow conditions, such as shear, impact, cavitation or sonication forces (patent application page 6, line 23 - page 7, line 3).

The reactor to be used according to the invention is thus defined by means of a result to be achieved, namely by generating pulverising forces, i.e. forces which cause particle size reduction of the reaction product to such an extent that submicron size particles are produced, and by certain "structural" requirements, namely by being under high pressure and under turbulent flow conditions. Such a definition encompasses a practically unlimited number of reactors and unless virtually every turbulent flow reactor under high pressure generates forces capable of producing submicron particles, the question arises whether the skilled person has been given sufficient information to enable him to select without undue burden from a number of available reactors achieving the desired result or to design a suitably configured reactor so that it can be considered that the invention can be carried out within the whole ambit of the claims.

- 6.3 That not all highly pressurised turbulent flow reactors would necessarily achieve the desired result is already apparent from the patent application itself. According to the description of the application turbulence is created by disturbing the laminar flow of the reaction mixture as it passes through the reactor (page 20, lines 5-7). It is, however, obvious from the same passage of the description that not any degree of perturbation and consequently not any degree of

turbulence is sufficient to achieve the desired result. The application states that "*However, the pressurised laminar flow of the reaction mixture must be perturbed to an extent sufficient to generate pulverising forces that affect size reduction of the pyrrithione salt particles*" (application page 20, lines 9-12).

Accordingly, a certain degree of perturbation and consequently a certain degree of turbulence is required to generate forces, for example shear, impact or cavitation forces or combinations thereof, which in turn have to be high enough to "pulverise" the reaction product to such an extent that submicron particles are obtained. No information as to the degree of perturbation or turbulence, and in particular the order of magnitude of the shear, impact or cavitation forces required to obtain submicron-sized particles of the reaction product are given in the application. It is to be remarked that sonication forces are not generated by perturbation, but in turn generate cavitation forces.

Neither does the patent application provide sufficient information as to how a reactor, apart from being highly pressurised and under turbulent flow, which according to the patent application itself is not sufficient per se, should be configured, in order to be capable of reliably generating the necessary degree of perturbation, turbulence and consequently "pulverising" forces high enough to achieve the desired result. The exact geometry of the reactor or more precisely of the reaction chamber undoubtedly has a significant influence on these parameters.

In the absence of such information the person skilled in the art has no criteria at his disposal allowing him

to identify or design a suitably configured reactor amongst the claimed host of highly pressurised turbulent flow reactors. He can only establish by trial and error whether a particular configuration of a turbulent flow reactor in combination with a high pressure will provide the required result, which amounts to undue burden. The functional definition of the reactor to be used according to the present invention is thus no more than an invitation to perform a research program in order to find a suitably configured high pressure turbulent flow reactor.

6.4 During oral proceedings before the Board, the Appellant argued that the person skilled in the art relying on general knowledge and the information given in the application would have no difficulties in selecting or constructing a suitably configured reactor.

6.4.1 According to the Appellant the patent application clearly disclosed that the submicron particles of pyrithione salts can be efficiently produced, if the reaction is carried out under condition of high pressure and turbulence (page 19, lines 1-4). The size reducing forces, namely shear forces, impact forces, cavitation forces and sonication forces were also clearly identified on page 7, lines 1-3 of the patent application. Furthermore, the skilled person being familiar with the physical equations of fluid dynamics and the phenomenon of turbulence and means to create it, will have no difficulties putting the claimed invention into practice. The equation of fluid dynamics are well known since the 1940s and form part of undergraduate studies. Moreover, means for creating turbulence, like baffles or dividing the pressurized reaction mixture

into two stream and bringing them back together again, are clearly indicated on page 20, lines 13 - page 21, line 4 of the patent application.

6.4.2 In addition, with the commercially available Laboratory Microfluidiser M-140K the patent application describes at least one suitable reactor. This reactor has been used in the examples and it is apparent from page 25 of the present application that submicron-sized polyvalent metal salts of pyrithione were obtained. The Appellant also put forward that other high pressure turbulent flow reactors were available to the skilled person allowing him to carry out the invention. In support, the Appellant referred to document (6), relating to high pressure pumps and homogenisers, and in particular, to page 8, left column, last paragraph describing a special homogenizing valve creating conditions of high turbulence and shear combined with compression, acceleration, pressure drop and impact.

6.5 The Board is not convinced by the Appellant's arguments.

6.5.1 As set out above (point 6.3) neither the combination of pressure and turbulence alone nor shear, impact, cavitation or sonication forces per se are sufficient for the production of submicron sized pyrithione salts. The question is therefore not whether the person skilled in the art knows how to create turbulence and generate shear, impact or cavitation forces, but whether the patent application provides sufficient information on how to create sufficiently high turbulence and to generate forces high enough to actually affect the reduction of the particles size of the reaction product.

6.5.2 Baffles and means of dividing the reaction mixture into streams and bringing them back together again as mentioned on page 20, lines 12-24 of the patent application are undoubtedly ways to create turbulence. However, equally undoubtedly, the degree of turbulence and the magnitude of the generated forces depend not only on the presence of such means, but are influenced by other factors, for example the size and arrangement of the baffles, the way the divided streams are guided through the reactor and brought back together, the velocity of the reaction mixture, the concentration of the particles in the reaction mixture etc. Thus, the reference to these means alone does not help the skilled reader to identify a suitable reactor configuration without undue effort.

6.5.3 Concerning the commercially available reactor mentioned in the patent application, it is not contested that by using this particular reactor at a high pressure, the degree of turbulence and the order of magnitude of forces generated in the reactor are high enough to reduce the particle size of the pyrithione salt to less than 1 micron. It is however pointed out that this reactor has a very unique geometry, as can be seen from document (5a). Material is introduced via a high pressure inlet and divided into two streams. The two streams run through two parallel channels having a certain diameter. At the end of each channel two channels, much smaller in diameter, branch off in a ninety degree angle and the two streams are brought back and collide head on in an impact zone, which has a low pressure outlet. This specific geometry in combination with high pressure generates a combination

of very high shear, impact and cavitation forces, which apparently result in submicron sized particles of the pyrithione salt. According to documents (5) and (5a) shear forces that are significantly higher than in other methods are achieved. The claimed subject-matter is however not limited to such a particular reactor. Furthermore, in the absence of any information on the degree of turbulence or the order of magnitude of the required forces and in the absence of sufficient instructions in the patent application as to the configuration requirements of the reactor which are necessary to reliably generate the forces high enough to reduce the particle size below 1 micron, this single and very specific example does not help the skilled reader in finding an alternative high pressure flow reactor with a different configuration.

6.5.4 With regard to document (6) provided by the Appellant to support its case it is to be remarked that the question is not whether or not there are other reactors available, the use of which would also achieve the desired result, but whether or not the skilled person is given enough information in the patent application to be able to select a suitable reactor without having to rely on undue experimentation. As set out above, this is not the case. The skilled person is therefore left with no choice, but trial and error.

6.6 During the written procedure the Appellant also argued that with the introduction of the high pressure and the temperature the claim is limited to condition which have been demonstrated as producing particles of the required size. In particular, the Appellant referred to page 21, lines 19-20 where it is described that a

pressure of 18,000 psi produces particles of 0.3 to 0.4 μm and the examples using a pressure of 18,000 psi or 20,000 psi and producing median sizes of 0.313 μm and 0.09 μm .

6.7 The Appellant's argument is not convincing as it neglects the fact that in addition to the pressure and the temperature, which may play an additional role as indicated on page 22, lines 3-5 of the patent application, the degree of turbulence and the order of magnitude of the generated forces are decisive for achieving the desired result. The specification of temperature and pressure alone are not sufficient.

6.8 Following from the above, the Board concludes that the patent application does not provide sufficient information for the skilled person to be able to carry out the invention over the whole breadth without undue burden. Consequently, the Appellant's second auxiliary request must be refused pursuant to Article 83 EPC.

Third, fourth and fifth auxiliary requests

7. *Amendments*

In view of the negative outcome with respect to sufficiency of disclosure, the Board can limit itself to the consideration of this requirement

8. *Sufficiency of disclosure*

8.1 Independent claim 1 of the third and fourth auxiliary request differs from claim 1 of the second auxiliary request in that the reactor further comprises either

i) baffles (third auxiliary request) or ii) a fixed geometry interaction chamber which divides the reaction mixture into a plurality of streams and brings them back together (third and fourth auxiliary request). Independent claim 1 of the fifth auxiliary request differs from claim 1 of the second auxiliary request in that the reactor further comprises the feature ii) and in that the process is limited to the preparation of zinc pyrithione. Thus, the structural requirements of the reactor have been further limited, while the functional definition that it generates forces high enough to obtain pyrithione salts with a particle size of less than 1 micron has been retained. This definition of the reactor still comprise a countless number of reactor configurations from which the skilled person has to select a suitable configuration, namely one that generates forces high enough to obtain the reaction product in the form of submicron sized particles.

8.2 As set out above (point 6.5.2) the features i) and ii) are means to create turbulence. However, the degree of turbulence and the order of magnitude of the required forces depend on additional features (see point 6.5.2 above). Since the patent application does not provide the skilled person with information on the necessary degree of turbulence or the order of magnitude of required forces, the skilled person is left to determine these additional features, like size, number or arrangement of the baffles in the reactor chamber, or the exact way of dividing, guiding the streams through the reactor and bringing them back together, by way of trial and error. Thus, the objections raised against claim 1 of the second auxiliary request and the

conclusion that the invention cannot be performed by the skilled person in the whole claimed area without undue burden still applies to claim 1 of the third, fourth and fifth auxiliary requests. Consequently, these requests must also fail for lack of sufficient disclosure, contrary to the requirement of Article 83 EPC.

8.3 Concerning the feature ii) of claim 1 of these auxiliary requests, the Appellant additionally argued that this feature specifically defines the described microfluidiser and accordingly limits the subject-matter of the claims to this reactor. In support, the Appellant referred to the example 1, in particular to page 24, lines 4-7 and 15-19, and to page 20, lines 16-20 of the patent application. According to example 1 the Laboratory Microfluidiser M-140K, which included a fixed geometry interaction chamber, has been used. This fixed geometry interaction chamber divides the reaction stream into two streams, and brings them back together thereby generating turbulence and pulverising forces leading to particle size reduction. The same wording has been used to describe feature ii) on page 20, lines 16-20 of the patent application. The Appellant also referred to document (5), wherein the expression fixed geometry interaction chamber technology has been used to describe the Laboratory Microfluidiser M-140K. Furthermore, the figures on the last page of document (5a) showed the feature of dividing a mixture into two or more streams which are brought back together.

8.4 The Board is not convinced by the Appellant's arguments.

Although it is not contested that the reaction chamber of the Laboratory Microfluidiser M-140K is constructed in such a way that it divides a mixture into two streams and brings them back together, this reaction chamber is clearly characterised by additional features, for example the diameter of the channels dividing the streams and those bringing them back again, the angles between those channels, the head on collision of the converging streams, the pressure drop (see diagrams on the last page of document (5a)). Apparently, these features are decisive for the generation of particularly high shear, impact and cavitation forces. Thus, by referring to the Laboratory Microfluidiser M-140K, example 1 refers not only to a reaction chamber which divides the reaction mixture into two streams and brings back together, but to a reaction chamber with additional structural requirements.

There is, however, no direct link to the Laboratory Microfluidiser M-140K on page 20, lines 16-24 of the patent application describing feature ii). This passage describes that the pressurized reaction mixture is passed through **a** fixed geometry interaction chamber without referring to a **specific** fixed geometry interaction chamber, like the one in the Laboratory Microfluidiser M-140K. Neither can the expression "fixed geometry interaction chamber" be interpreted as referring exclusively to the specific Laboratory Microfluidiser M-140K merely in view of the fact that the same wording has been used to describe this reactor. Other "fixed geometries" whereby the separated streams are channelled through the reactor and brought

back together in a different way than in the Laboratory Microfluidiser M-140K are conceivable.

Thus, feature ii) in claim 1 of the third, fourth and fifth auxiliary request does not limit the subject-matter of these requests to the specific microfluidiser used in the patent application.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The chairman:

M. Schalow

P. Ranguis