Internal distribution code:

(A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 8 November 2018

Case Number: T 0448/15 - 3.3.03

Application Number: 06782584.4

Publication Number: 1921096

IPC: C08F210/18, C08L23/16

Language of the proceedings: EN

Title of invention:
COPOLYMER RUBBER, RUBBER COMPOSITIONS AND RUBBER MOLDINGS

Patent Proprietor:
Mitsui Chemicals, Inc.

Relevant legal provisions:
EPC Art. 100(b), 111(1)

Keyword:
Grounds for opposition - insufficiency of disclosure (no)
Appeal decision - remittal to the department of first instance (yes)

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 0448/15 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 8 November 2018

Appellant: (Patent Proprietor)	Mitsui Chemicals, Inc. 5-2, Higashi-Shimbashi 1-chome Minato-ku Tokyo 105-7117 (JP)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 8 January 2015 revoking European patent No. 1921096 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	D. Semino
Members:	F. Rousseau
	C. Brandt

Summary of Facts and Submissions

I. The appeal by the patent proprietor lies from the decision of the opposition division posted on 8 January 2015 revoking European patent No. 1 921 096 on the ground that it did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

II. The decision was based on the patent as granted whose claims 1 and 2 read as follows:

"1. A copolymer rubber that is a random copolymer of
(A) ethylene (A),
(B) a C_{3-20}-α-olefin (B), and
(C) a non-conjugated polyene having two carbon-carbon double bonds, a part or all of which is 5-vinyl-2-norbornene (VNB);
which copolymer rubber satisfies the conditions (1)-(5):

(1) the molar ratio (A)/(B) of units derived from (A) and units derived from (B) is 40/60 to 95/5;
(2) based on the sum of structural units in the copolymer rubber of 100 mol-% the content of units derived from (VNB) is 0.01-0.4 mol-%, and the total content of units derived from (C) is 0.01-5 mol-%;
(3) the intrinsic viscosity (IV)[μ] measured in decalin at 135°C is 1.0-5.0 dl/g;
(4) the Mw/Mn is in a range of 1-8; and
(5) P represented by the formula

$$P = Ln(IV[\mu]) - 5.0x10^{-5}\ \eta^{*}(10)$$

(wherein Ln is a natural logarithm and η*(10) is the viscosity (Pa.sec) measured at 10 rad/sec and 190°C) is 0.46-1.00.

2. A process for producing the copolymer rubber of claim 1, comprising copolymerizing ethylene (A), the C_{3-20}-α-olefin (B) and the non-conjugated polyene (C), and then melt kneading the obtained copolymer rubber."

III. The following documentary evidence was cited inter alia before the opposition division:

D6: Experimental results shown in Table A of the notice of opposition

IV. The opposition division essentially held that the selection of suitable melt-kneading conditions to adjust the complex viscosity $\eta^*(10)$ of the copolymer rubber by melt-kneading so as to arrive at a rubber exhibiting the claimed P value constituted undue burden for the skilled person, in particular because the patent in suit did no teach the intrinsic viscosity IV[μ] and the complex viscosity $\eta^*(10)$ of the copolymer rubber prior to the kneading step. Accordingly, the copolymer rubber of claim 1 and for the same reasons the process for its production as defined in claim 2 were insufficiently disclosed.

V. An appeal against that decision was lodged by the patent proprietor (appellant) with letter of 27 February 2015.

VI. The opposition was withdrawn with letter of 17 March 2015 so that the former opponent (respondent) in the present appeal proceedings did not make any

submissions in respect of the appeal of the patent proprietor.

VII. The statement setting out the grounds of appeal was filed with letter of 18 May 2015.

VIII. The submissions of the appellant, as far as they are relevant for the decision, can be summarized as follows:

(a) The negative opinion of the opposition division on sufficiency of disclosure related only to the choice of the starting copolymer rubber and the processing conditions to be used to fulfil the condition on parameter P. In particular, it had not been disputed how to provide a copolymer rubber meeting conditions (1) to (4) set out in claim 1.

(b) Paragraph [0022] of the patent described that the value of parameter P of the copolymer rubber could be adjusted by melt-kneading under relatively mild conditions such as in an extruder used in usual pelletization. As explained on page 5, lines 6-7 that procedure resulted in almost no change of the intrinsic viscosity, while the value of $\eta^*(10)$, referred to as the complex viscosity, became smaller with the degree of kneading. In view of this the skilled person would have selected a starting copolymer rubber fulfilling the structural conditions (A) to (C) and the parametric conditions (1) to (4) defined in claim 1, but whose complex viscosity $\eta^*(10)$ was high enough to ensure that after melt-kneading the resulting lowered $\eta^*(10)$ was such that condition (5) was also fulfilled. Moreover based on the value of the intrinsic viscosity and the range of values to be achieved

for parameter P, one could calculate in view of relationship (5) the starting value $\eta^*(10)$ of the copolymer rubber which would be lowered by melt-kneading. Some concrete examples of suitable starting materials were provided with comparative examples 1 to 5 of the patent in suit and it had not been contested that the skilled person would know how to prepare such copolymer rubbers. Hence, the decision under appeal was incorrect in concluding that it was not clear "*what intermediate products, in the sense of being unkneaded, should be used for the present invention*".

(c) The melt-kneading procedure to be applied to adjust the value of parameter P was generally described in paragraph [0022] and in greater detail in paragraphs [0043] and [0044] in the context of Example 1. The procedure described in Example 1 could be easily reproduced and the example indicated one way of carrying out the invention as required by the case law.

(d) The experiments carried out by the former opponent and shown in D6 did not represent an exact reproduction of the teaching of the patent in suit, in particular with respect to the equipment and conditions used for melt-kneading the copolymer rubber. The experimental data shown in D6 merely demonstrated that the procedure selected by the former opponent was not (yet) suitable for preparing the claimed copolymer rubber. These data nevertheless showed that melt-kneading under relatively mild conditions decreased the complex viscosity $\eta^*(10)$ while the intrinsic viscosity was not significantly changed. Considering the differences in the experimental procedures adopted

by the former opponent, the skilled person would in particular modify the melt-kneading conditions used, in particular the duration of the melt-kneading or the energy consumption used for that step. It was to be emphasized that an objection of lack of sufficiency of disclosure could only be successful if there were serious doubts substantiated by verifiable facts, which was not the case in view of the experimental data available or other submissions by the former opponent. Sufficiency of disclosure should therefore be acknowledged.

IX. The appellant requested that the decision under appeal be set aside, sufficiency of disclosure of the subject-matter defined in the claims as granted be acknowledged and the case be remitted to the opposition division for the evaluation of novelty and inventive step of the subject-matter defined in the claims as granted.

Reasons for the Decision

Procedural issues

1. During appeal, the sole opponent withdrew its opposition, the patent proprietor being now the sole remaining party to the appeal proceedings. According to established case law (Case Law of the Boards of Appeal of the EPO, 8th edition, 2016, IV.C.4.3.3) the withdrawal of an opposition has no direct procedural consequences for the appeal proceedings if the opponent was the respondent and the patent was revoked by the contested decision, as it is the principal task of the boards of appeal to review the decision under appeal on the basis of the appellant's requests. In such case, the board must carry out a substantive examination of

the opposition division's decision, and can only set aside this decision if the grounds for opposition which led to revocation of the patent do not prejudice the maintenance of the patent. The board's examination can include the examination of submissions and evidence filed by the respondent prior to the withdrawal of the opposition. This, however, cannot mean that the appeal procedure should become more investigative following the withdrawal of the opposition and that the Board should take a more active role substituting itself for the former opponent, since there is no justification for the former opponent taking advantage of the withdrawal of its opposition.

Sufficiency of disclosure

2. According to the established jurisprudence of the Boards of Appeal of the EPO a European patent complies with the requirements of sufficiency of disclosure, if a skilled person, on the basis of the information provided in the patent specification and, if necessary, using common general knowledge, is able to carry out the invention as claimed in its whole extent with undue burden, i.e. with reasonable effort. According to the case law (Case Law, supra, II.C.4.2 and II.C.4.4), an invention is in principle sufficiently disclosed if at least one way is clearly indicated enabling the person skilled in the art to perform the invention in the whole range that is claimed.

3. The objection that the invention lacks sufficiency of disclosure is directed against the copolymer rubber of granted claim 1 and a process for its production as defined in granted claim 2. The rubber composition of claim 1 is defined in terms of structural features - it is a random copolymer comprising specific repeating

units whose amounts are also specified - as well as in terms of parametric features, which set out the intrinsic viscosity (IV)[µ] in the range of 1.0 to 5.0 dl/g (measured in decalin at 135°C), the polydispersity Mw/Mn in the range of 1 to 8 and a parameter P in the range of 0,46 to 1,00, wherein P = Ln(IV[µ]) - $5.0x10^{-5}\eta^*(10)$ with Ln being the natural logarithm and $\eta^*(10)$ the complex viscosity (Pa.sec) measured at 10 rad/sec and 190°C. Claim 2 explicitly refers to claim 1 for the definition of the copolymer rubber and therefore contains by reference to claim 1 the same structural and parametric requirements in addition to the process steps of polymerizing the polymeric units (A) to (C) and melt-kneading the obtained copolymer rubber.

4. According to paragraph [0023] of the patent in suit the process of preparing the copolymer rubber of the present invention includes a copolymerization step, followed by an isolation step and a drying step, as well as a melt-kneading step of the dried copolymer rubber in order to adjust the parameter P.

4.1 The objection in respect of insufficiency of disclosure concerns the ability of the skilled person (i) to find out the intrinsic viscosity IV[µ] and the complex viscosity $\eta^*(10)$ which the copolymer rubber should exhibit prior to the kneading step (see reasons for the contested decision, page 3, second paragraph and page 4, second full paragraph) and (ii) to adjust the conditions for melt-kneading the copolymer rubber in order to meet the condition on parameter P, expressing the relationship between said intrinsic viscosity IV[µ] and complex viscosity $\eta^*(10)$.

4.2 The only specific information concerning the method of preparing the copolymer rubber to be melt-kneaded is provided in the experimental part of the patent in suit, namely in paragraphs [0040] to [0042] describing the copolymerisation, separation and drying steps of the copolymer rubber of Example 1, namely a specific quaternary copolymer rubber of ethylene, propylene, 5-ethylidene-2-norbornene (ENB) and 5-vinyl-2-norbornene (VNB), in which a suitable catalytic system based on $VOCl_3$ and $Al(C_2H_5)_{1.5}Cl_{1.5}$ and suitable polymerization conditions are inter alia described. In the absence of any proof to the contrary the Board has no reason to doubt that the skilled person could use a similar polymerization method, in particular the catalytic system employed in that example, in order to prepare the copolymer rubber to be melt-kneaded whose structural features implicitly correspond to those defined in granted claim 1 for the melt-kneaded copolymer rubber.

4.3 As regard the melt-kneading, paragraph [0022] of the specification teaches that such step is carried out under relatively mild conditions, for example, with an extruder used in usual pelletization. In this case, the intrinsic viscosity IV[μ] is indicated not to vary much under usual melt-kneading condition, while the value of the complex viscosity η* (10) becomes smaller with the degree of kneading. The specification does not provide a general indication concerning the "relatively mild conditions" to be applied for the melt-kneading step, but an example of such conditions can be found in the experimental part of the patent in suit, i.e. in paragraphs [0043] and [044] describing the preparation of the copolymer rubber obtained in Example 1. Additional specific extrusion conditions are also

taught on page 9, Table 9 for the preparation of the rubber copolymers of Examples 2 to 10.

4.4 On the one hand, the indication in paragraphs [0022] and [0023] that under relatively mild conditions the intrinsic viscosity IV[µ] does not vary much, but the value of the complex viscosity η* (10) becomes smaller with the degree of melt-kneading, cannot be verified in the light of the experimental evidence contained in the patent in suit, since the intrinsic viscosity IV[µ] and the complex viscosity η* (10) of the copolymer rubbers prior to the melt-kneading step are not described for Examples 1 to 10 of the patent in suit. In addition, the influence of the extrusion conditions on the intrinsic viscosity IV[µ] and the complex viscosity η* (10) cannot be determined on the basis of the same examples, since even for copolymer having an apparently identical composition, it is unknown whether those examples were carried out with the same starting copolymer rubber varying only the kneading conditions, in view of the wording used in paragraph [0045] of the patent in suit according to which various conditions for polymerization and extrusion were varied with respect to Example 1 when performing Examples 2 to 10.

On the other hand, there is no evidence on file disproving the statement contained in the patent in suit that under relative mild conditions, such as those used in the examples of the patent in suit, the intrinsic viscosity IV[µ] does not vary much while the value of complex viscosity η* (10) becomes smaller with the degree of melt-kneading. There is also no indication that this teaching would not be generally valid for the copolymers defined in claim 1, i.e. with copolymers having a different structural definition than those used in the examples. On the contrary, the

experimental results submitted by the former opponent with D6 concerning the alleged reproduction of the (unkneaded) copolymer rubbers of Comparative Examples 1 and 4 of the patent in suit and their melt-kneading, which results have been reproduced on page 8 of the statement setting out the grounds of appeal, confirm and therefore render credible that melt-kneading of copolymer rubbers indicated to have a structural composition and an intrinsic viscosity within the definition provided in claim 1 of the granted patent leads to a decrease of their complex viscosity η* (10), while the intrinsic viscosity IV[μ] is substantially not affected, leading thereby to an increase of parameter P.

The experiments of the former opponent reported in D6, however, do not reproduce the exact melt-kneading conditions employed in the examples of the patent in suit and do not concern the influence of the degree of melt-kneading on the value of parameter P. Accordingly, they are not suitable to demonstrate that the skilled person by following the teaching of the patent in suit and increasing the degree of melt-kneading could not further lower the complex viscosity η* (10) so as to obtained the targeted P value.

Accordingly, in the absence of evidence to the contrary, the Board has no reason to assume that the skilled person based on the information described in Example 1 of the patent in suit concerning the polymerization, separation and drying steps as well as the melt-kneading conditions would not be in the position to prepare the copolymer rubbers generally defined in claim 1 as granted by varying the degree of melt-kneading.

4.5 Regarding the values of the intrinsic viscosity IV[μ] and of the complex viscosity $\eta^*(10)$ to be fulfilled by the copolymer rubber prior to the kneading step, it is reasonable to consider, in line with the argumentation submitted by the appellant, that the skilled person would seek to prepare a copolymer rubber which before the melt-kneading step exhibits an intrinsic viscosity IV[μ] value close to the targeted value, since the intrinsic viscosity IV[μ] is under the mild-condition employed for the melt-kneading step not substantially modified. The Board is persuaded that this can be achieved following the polymerization steps taught in Example 1 and if necessary varying the concentration of hydrogen used as a molecular weight regulator, and therefore implicitly as a regulator of the intrinsic viscosity IV[μ] sought to be obtained.

4.6 In this context, the alleged repetition of Comparative Examples 1 and 4 of the patent in suit whose results are shown in Table A of D6 and which are meant to represent the copolymer rubbers obtained in Examples 1 and 4 before a melt-kneading step is performed do not demonstrate that the skilled person using the catalytic system taught in Example 1 of the patent in suit and varying the hydrogen concentration would not be able to readily adjust the targeted intrinsic viscosity IV[μ] prior to the melt-kneading step. In the Board's view the statement by the former opponent on page 5 of the grounds for opposition according to which the repetition of Comparative Examples 1 and 4 had been obtained "*exactly in accordance with the procedure given in exp. 1 of the contested patent*" is obscure, not only because the comparative examples addressed concern the preparation of two structurally different copolymers, whereas Example 1 of the contested patent only concerns the preparation of a single copolymer,

but also because the polymerization conditions used for the preparation of the copolymer rubber of Comparative Example 4 are even not disclosed in the patent in suit, so that it cannot be held that those conditions have been repeated. On that basis and in the absence of an exact description of the polymerization procedure and conditions used by the former opponent for the preparation of the copolymer rubbers 1 and 4 prepared by the former opponent and addressed in Table A of D6, the Board has no reason to consider that the experimental results submitted by the former opponent with D6 demonstrate that the skilled person would not be able to adequately adjust the targeted intrinsic viscosity IV[µ] prior to the melt-kneading step.

4.7 As to the question which complex viscosity $\eta^*(10)$ the copolymer rubber should exhibit prior to the kneading step, the Board observes that the only requirement in terms of that parameter in the claim is its value after the melt-kneading step through the range of the P value, which means, taking into account that melt-kneading will not lead to an increase of the complex viscosity and the decrease of this parameter is adjusted by the degree of melt-kneading, that the complex viscosity $\eta^*(10)$ of the copolymer rubber prepared prior to the kneading step should be at least 20000 x (Ln(IV[µ])-P), IV[µ] and P being in the ranges defined in claim 1. In the absence of any evidence to the contrary, the Board has no reason to consider that the skilled person using the polymerization method and catalytic system employed in Example 1 while targeting an intrinsic viscosity IV[µ] in the range defined in granted claim 1 would not obtain a copolymer rubber fulfilling that condition. The only evidence submitted by the former opponent concerns the impossibility to melt-knead the copolymer rubber so as to obtain

parameter P in the range claimed, which evidence does not concern the melt-kneading conditions used in Example 1 of the patent in suit or variation/ intensification of the degree of melt-kneading as indicated in above point 4.4. There is also no evidence that the skilled person following the teaching of the patent in suit would obtain a melt-kneaded polymer having a polydispersity outside the range defined in claim 1.

5. According to the case law (*supra*, II.C.8) the objection of lack of sufficient disclosure presupposes that there are serious doubts, substantiated by verifiable facts. Accordingly, in view of the previous analysis and in the absence of substantiating facts and corroborating evidence in support of the objection that the claimed subject-matter of claim 1 is insufficiently disclosed, in particular that the teaching provided in the specification cannot lead to the claimed subject-matter without unreasonable effort, the arguments of the former opponent are mere speculations which cannot convince the Board. Accordingly, no case has been made that the invention defined by the terms of claim 1 lacks sufficiency of disclosure.

6. The subject-matter of claim 2 defines the production of the copolymer rubber of claim 1 by copolymerization of its monomeric units and then melt kneading of the obtained copolymer rubber, i.e. the process steps already addressed in above points when considering sufficiency of disclosure of claim 1. Accordingly, the above considerations in respect of granted claim 1 also hold true for the method of granted claim 2.

Remittal

7. Having reviewed the decision under appeal, the Board has not taken a decision on the whole matter, since the opposition division decided solely on the issue of whether granted claims 1 and 2 fulfilled the requirements of sufficiency of disclosure. As the opposition division has not yet decided on novelty and inventive step of the claimed subject-matter, the Board in agreement with the request of the patent proprietor considers it appropriate to exercise the power conferred to it by Article 111(1) EPC to remit the case to the opposition division for further prosecution in order to enable the department of first instance to decide on the outstanding issues.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance for further prosecution.

The Registrar: The Chairman:

B. ter Heijden D. Semino

Decision electronically authenticated