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**Datasheet for the decision of 16 April 2020**

**Case Number:** T 1323/17 - 3.3.03

**Application Number:** 10767129.9

**Publication Number:** 2423253

**IPC:** C08L9/00, C08K3/04, C08K3/34, C08K3/36, B60C1/00, C08L7/02, C08K3/22, C08K3/00

**Language of the proceedings:** EN

**Title of invention:**
RUBBER COMPOSITION AND PNEUMATIC TIRE

**Patent Proprietor:**
Bridgestone Corporation

**Opponent:**
Cabot Corporation

**Relevant legal provisions:**
EPC Art. 54, 56
RPBA Art. 12(2), 12(4)
RPBA 2020 Art. 25

**Keyword:**
Novelty - implicit disclosure - no
Inventive step - (no)
Auxiliary requests - not substantiated - not admitted

**Decisions cited:**
T 0035/85

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Office européen des brevets

**Beschwerdekammern**

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**Case Number: T 1323/17 - 3.3.03**

# D E C I S I O N
# of Technical Board of Appeal 3.3.03
# of 16 April 2020

| | |
|---|---|
| **Appellant:** (Opponent) | Cabot Corporation<br>Two Seaport Lane<br>Suite 1300<br>Boston<br>MA 02210-2019 (US) |
| **Representative:** | Grünecker Patent- und Rechtsanwälte<br>PartG mbB<br>Leopoldstraße 4<br>80802 München (DE) |
| **Respondent:** (Patent Proprietor) | Bridgestone Corporation<br>10-1, Kyobashi 1-chome,<br>Chuo-ku<br>Tokyo 104-8340 (JP) |
| **Representative:** | Oxley, Robin John George<br>Marks & Clerk LLP<br>15 Fetter Lane<br>London EC4A 1BW (GB) |
| **Decision under appeal:** | **Decision of the Opposition Division of the European Patent Office posted on 31 March 2017 rejecting the opposition filed against European patent No. 2423253 pursuant to Article 101(2) EPC.** |

**Composition of the Board:**

| | |
|---|---|
| **Chairman** | D. Semino |
| **Members:** | F. Rousseau |
| | R. Cramer |

## Summary of Facts and Submissions

I. The appeal lies against the decision by the opposition division, posted on 31 March 2017, rejecting the opposition against European patent No. 2 423 253, whose claim 1 read as follows:

"1. A rubber composition, comprising:

a rubber component formed of a diene-based rubber; and
a filler,
wherein when an actual density determined by JIS K6268 method A is represented by dc, and a density and a mass fraction of a component i determined by constituent analysis are represented by di and Φi, respectively, the actual density, the density, and the mass fraction satisfy a relationship represented by the following formula (1).

$0.970 \leq dc.\Sigma(\Phi i/di) \leq 0.980$ ...(1)"

II. The following evidence was submitted *inter alia* before the opposition division:

D4: WO 2009/032178 A1
D5: Kobelco, HYPERKTX, Twin Screw Extruder, KOBE STEEL, LTD. Machinery Business
D6: US 2008/0214700 A1
D11: Declaration of Martin C. Green dated 21 December 2016

III. In the impugned decision the opposition division held inter alia that the ratio of the actual density to the theoretical density did not render the scope of claim 1

unclear since the density was no unusual parameter. Since the specification contained sufficient examples and comparative examples to enable a skilled person to carry out the invention and the opponent had not provided any evidence, e.g. by worked examples, that the invention as disclosed could not be carried out by a skilled person, the requirements of sufficiency of disclosure were considered to be fulfilled. Moreover, novelty was acknowledged in particular over the rubber compositions disclosed of D6, because the parametric value defined in granted claim 1 could not be determined for those compositions based on the disclosure of D6 and no experimental evidence had been submitted in this respect. The pure assumption that a similar process as used in D6 would inevitably lead to rubber compositions which fulfilled the parametric condition of claim 1 was not sufficient to deny novelty. Regarding inventive step D6 represented the closest prior art. The problem solved by the patent in suit over that prior art was seen in the provision of a rubber composition for tires with an improved balance of weight reduction and reduction of the rolling resistance. An inventive step was acknowledged since D6 did not concern the weight reduction and the rolling resistance and because the additional documents cited by the opponent were silent about the actual density or the calculated density of the rubber composition disclosed and/or about tire rolling resistance or weight reduction.

IV. The opponent (appellant) lodged an appeal against the above decision, the statement of grounds for appeal being submitted with letter of 10 August 2017.

V. The patent proprietor (respondent) submitted with its rejoinder of 21 December 2017 *inter alia* the following document:

D18: "Dispersive Mixing Studies in the Farrel Twin-Screw Extruder", L.N. Valsamis et al, paper submitted for presentation at the 9th International Conference on Polyolefins, Houston, Texas, February 1995.

VI. The respondent submitted with letter of 3 May 2018 sixteen auxiliary requests.

VII. In preparation of oral proceedings foreseen for 2 April 2020, the Board issued a communication dated 12 February 2020 including a preliminary opinion *inter alia* on inventive step starting from the disclosure of D6 as the closest prior art and on the admittance of the auxiliary requests.

VIII. With letter of 7 January 2020 the respondent informed the Board that it would not be represented at the oral proceedings. With letter of 24 March 2020 the respondent withdrew its request for oral proceeding.

IX. Oral proceedings were thereafter cancelled by the Board.

X. The appellant's submissions, in so far as they are pertinent, may be derived from the reasons for the decision below. They are essentially as follows:

(a) The subject-matter of claim 1 of the main request lacked sufficiency of disclosure and novelty in particular over the disclosure of D6.

(b) If novelty of the subject-matter of claim 1 could be acknowledged over D6, an inventive step should be denied starting from the disclosure of this document as the closest prior art.

(c) D18 and the second to sixteenth auxiliary requests should not be admitted into the proceedings.

XI. The respondent's submissions, in so far as they are pertinent, may be derived from the reasons for the decision below. They are essentially as follows:

(a) The subject-matter of claim 1 of the main request was sufficiency disclosed and novelty in particular over the disclosure of D6 should be acknowledged.

(b) Regarding inventive step, the results presented in the patent demonstrated that a rubber composition meeting the parameter of claim 1 displayed an advantageous combination of rolling resistance and abrasion resistance. This was not suggested in the prior art. The presence of an inventive step should therefore be acknowledged in particular with regard to D6 as the closest prior art.

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

The appellant also requested to consider its request for correction of the minutes of the oral proceedings before the opposition division.

XIII. The respondent requested that the appeal be dismissed, or alternatively that the decision under appeal be set aside and that the patent be maintained in amended form

according to any of the first to sixteenth auxiliary requests, all submitted with letter of 3 May 2018.

## Reasons for the Decision

1. The respondent has withdrawn its request for oral proceedings after having informed the Board that it would not be represented therein. Thus the respondent bases its case on its written submissions. In this respect the respondent had the possibility to take position on all the issues on which this decision is based (inventive step of the subject-matter of claim 1 of the main request starting from D6 as the closest prior art and admittance of the auxiliary requests), as they were dealt with both in the submissions of the appellant and in the communication of the Board. As the Board was in the position to decide according to the request of the appellant, the decision could be taken in writing.

*Main request (patent as granted)*

*Meaning of claim 1*

2. The rubber composition of claim 1 is defined in terms of structural features - it comprises a rubber component formed of a diene-based rubber and a filler - as well as in terms of a parametric feature, namely that the relationship $0.970 \leq dc.\Sigma(\Phi i/di) \leq 0.980$ is fulfilled, wherein dc is defined to be an actual density determined by JIS K6268 method A, and di and Φi are defined to represent "a density" and "a mass fraction" of a component i determined by constituent analysis.

2.1 Whereas the actual density of the composition dc has a clear meaning, no definition of the components i to be taken into account for the calculation of the term $\Sigma(\Phi i/di)$ is provided in the claim, di and $\Phi i$ being merely defined to represent a density and a mass fraction of a component i determined by constituent analysis. In the absence of a complete definition for $\Sigma(\Phi i/di)$ in the present claim or any indication that this expression would have a well recognized meaning in the art, the meaning of the relationship $0.970 \leq dc.\Sigma(\Phi i/di) \leq 0.980$ is not clear, which ambiguity is however not open to objections under Article 84 EPC in accordance with the ruling of G 3/14 (OJ EPO 2015, A102), as present claim 1 is in its granted form.

2.2 In order to address the objections raised by the appellant, in particular lack of novelty and inventive step in the light of D6, it is therefore necessary to construe the meaning of the double inequality $0.970 \leq dc.\Sigma(\Phi i/di) \leq 0.980$ in the light of the description. Relevant information in this respect is given in particular in paragraphs [0035], [0036] and [0042] to [0052] of the specification.

2.3 According to paragraph [0035] $\Sigma(\Phi i/di)$ is the reciprocal of a density called the theoretical density. This theoretical density is defined in paragraphs [0042] and [0043] to be calculated based on results obtained by analysis of "*a vulcanized rubber (rubber composition) of interest to identify incorporated components and determine the content of each component*". The procedure to be followed is defined in subsequent paragraphs [0044] to [0052] in which the analytical methods to be used for determining the content of various compounds are described. Certain density values to be taken into account for calculating

Σ(Φi/di) are understood to be the specific density values for those compounds which have been set to predetermined fixed values, in particular for the rubber component (paragraph [0046]), carbon black (paragraph [0047]), silicone dioxide (paragraph [0050]), whereas the values for "Solvent extract" and the "Other component" (paragraphs [0045] and [0051]) are to be measured in accordance with JIS K0061.

2.4 Furthermore, paragraph [0036] states that the "*theoretical density is a density determined from the mass fraction of each constituent by analysis, when it is assumed that each component exists in a single, dense state. On the other hand, the actual density depends on a mutual dispersed state of the respective components, and has a low value when the dispersion is poor or conversely has a high value when the dispersion is improved by rubber kneading before vulcanization*". The relationship between the actual density dc, the "reciprocal of the theoretical density" Σ(Φi/di) and the degree of dispersion of the components of the rubber composition before vulcanization, which is described in this passage of the specification, also emerges from the teaching concerning the preparation of the claimed rubber compositions.

2.4.1 According to granted claim 6 the rubber composition is produced by dispersing a filler in a rubber component formed of a diene-based rubber to produce a rubber-filler composite, a wet masterbatch being preferably used (paragraph [0076]), and mixing the rubber-filler composite with a rubber compounding material. This method is described in paragraphs [0085] to [0108]. It consists essentially in (a) preparing a liquid rubber material (e.g. a rubber latex), (b) dispersing therein a filler (e.g. carbon black), (c) subjecting the

mixture obtained to a coagulation treatment, (d) kneading out the coagulated product formed with a first kneading machine to dry this wet-masterbatch and disperse the filler therein and (e) mixing the rubber compounding materials into the dried wet-masterbatch obtained in the previous step (d) with a second kneading machine.

2.4.2 According to paragraph [0108] subjecting "*the coagulated product to such kneading as described above improves the dispersibility of the filler in the rubber component and enables the setting of the ratio of the actual density to the theoretical density within the range represented by the formula (1)*", i.e. an improvement of the dispersibility of the filler in the rubber composition is required to meet the parametric requirement of claim 1, which improvement of the dispersibility of the filler in the rubber composition is achieved by sufficient kneading of the wet masterbatch using one of the kneading means described in the preceding paragraphs.

2.4.3 According to preceding paragraphs [0104] to [0107] the kneading "*is preferably performed in a continuous fashion from the viewpoint of industrial productivity because the kneading and the drying are performed with the first kneading machine while the mechanical shear force is applied. Although an apparatus provided with a uniaxial screw can also be used, a multi-axial kneading extruder in which axes rotate in the same direction or in different directions is more preferably used. For example, a kneader having two mating rotors that mate with each other or a Banbury mixer can be suitably used as the first kneading machine. In this case, the kneading is repeated preferably twice or more, more preferably three times or more. In addition,*

*thereafter, kneading with a biaxial kneading extruder may be further performed. In addition, a biaxial kneading extruder is particularly preferably used. When the kneading is performed with the above-mentioned biaxial kneading extruder, a kneading block is preferably used for 10% or more of the length of each rotation axis in the biaxial kneading extruder, and the kneading block is more preferably used for 20% or more thereof. In addition, thereafter, kneading with a Banbury mixer or a kneader having mating rotors may be further performed. On the other hand, when the kneading block is used for less than 10% of the length of each rotation axis in the biaxial kneading extruder (the kneading block may be preferably absent), kneading is preferably performed with at least one of the Banbury mixer and the kneader having mating rotors after the kneading with the biaxial kneading extruder*". The essence of this teaching is therefore that sufficient kneading of the wet masterbatch should take place, e.g. by using several kneading steps in a Banbury mixer or a biaxial kneading extruder having a minimum portion of the rotation axis equipped with kneading blocks.

2.4.4 A correlation between dc.Σ(Φi/di) and the kneading conditions of the wet masterbatch is confirmed by a comparison of the results obtained for Example 1 (paragraph [0129] referring to test composition 1 described in paragraphs [0121] to [0123] and Table 2 on page 16) and for Comparative Example 2 (paragraph [0158] and Table 3 on page 19). These two experiments differ only in that the kneading of the wet masterbatch (a natural rubber/carbon black coagulate) is carried out in Example 1 using more severe kneading conditions obtained by equipping 15% of the length of each rotation axis of the kneading extruder with a kneading block, whereas in Comparative Example 2 the entire

length of each rotation axis of the biaxial kneading extruder consists of a screw segment for conveyance. The use of more severe kneading conditions leads to an increase of the dc.Σ(Φi/di) value from 0.969 for Comparative Example 2 to 0.972 for Example 1.

2.5 As noted by the appellant the theoretical density is defined with an accuracy of 3 digits after the decimal point, whereas the density of the various components set or measured used for calculating the theoretical density is defined with an accuracy of only 2 digits. Accordingly, the significance of the third digit when computing the theoretical density and the density ratio is questionable. In addition in spite of the fact that the same test composition 1 is used in Examples 1 to 4 and 7 of the patent in suit, different amounts of carbon black ranging from 47.1 to 47.6 parts by weight for 100 parts by weight natural rubber are identified upon analysis of the vulcanized rubber (page 16, Table 2, third row), which necessarily has an impact on the computation of the theoretical density, since large amounts of carbon black are used. This is also observed for test composition 3 used in Example 5 and Comparative Examples 3 and 4. This also raises the question of the significance of the third digit after the decimal point for defining the density ratio when results of the analysis of the vulcanised rubber constituent are subject to such variability.

2.6 Notwithstanding the doubts concerning the significance of the third digit after the decimal point when determining dc.Σ(Φi/di) and the corresponding doubts about the significance of defining that the values taken by this parameter are within a range from 0.970 to 0.980, the Board nevertheless concludes on the basis of the information in the patent that the double

inequality $0.970 \leq dc.\Sigma(\Phi i/di) \leq 0.980$ must be understood as a definition of the state of dispersion of the filler (e.g. carbon black) present in the rubber composition.

*Novelty over D6*

3. The appellant objects that the subject-matter of claim 1 is anticipated by the disclosure of D6, reference being made in particular to paragraph [0063] of that document. This passage of D6 which is embodied in the experimental part of that prior art concerns the drying step of a wet natural rubber/carbon black masterbatch obtained as shown in paragraphs [0060] to [0062] by forming a natural rubber latex, dispersing therein carbon black and performing a coagulation step.

3.1 The drying step described in paragraph [0063] is carried out in a twin-screw kneading extruder (co-rotating screws with a diameter of 30 mm, L/D=35) manufactured by Kobe Steel at a barrel temperature of 120° C and a rotation speed of 100 rpm. The amount of carbon black in the obtained masterbatch is of 45 parts by weight parts for 100 parts by weight of the natural rubber. The synthesis described in D6 comprises also a step of kneading said masterbatch with further components needed for the preparation of the rubber composition such as vulcanizing agent and vulcanizing accelerator, the resulting rubber compositions being evaluated among others for abrasion resistance (paragraph [0065]). It is undisputed that the only feature potentially distinguishing the rubber composition of operative claim 1 from the disclosure of D6 is the parametric value of $dc.\Sigma(\Phi i/di)$ comprised between 0.970 and 0.980, and that D6 does not contain any explicit disclosure of that feature.

3.2 As to the question whether the disputed feature may be considered as implicitly disclosed, the appellant has not shown that the kneading conditions described in D6 (kneading extruder, barrel temperature, rotation speed) are such that the state of dispersion of the filler present in the rubber composition would necessarily correspond to a dc.Σ(Φi/di) value being comprised between 0.970 and 0.980. In other words the appellant has not shown that meeting the parametric condition of operative claim 1 is the inevitable result of what is explicitly derivable from said prior art. The appellant's argument that the extruder used in the experimental part of D6 is the extruder HYPERKTX 30 shown in D5 which is equipped with a kneading block for more than 10% of the length of each of the rotation axis of the extruder and therefore would be suitable according to the teaching of the patent in suit to obtain the dc.Σ(Φi/di) value required by operative claim 1 is in particular not convincing, because as argued by the respondent the screw diameter mentioned in D5 for HYPERKTX 30 (page 8, top of the right-hand column) does not correspond to that indicated in paragraph [0063] of D6 and D6 itself does not mention the use of such portion of kneading blocks.

3.3 Accordingly, no case has been made that the subject-matter of claim 1 lacks novelty over D6.

*Inventive step*

*Closest prior art*

4. According to paragraph [0007] of the patent in suit an object of the invention was to provide "*a rubber composition for reducing the weight of a tire without reducing the durability of the tire such as abrasion*

*resistance and for achieving a high level of balance between the weight reduction and a reduction in the rolling resistance of the tire, and a pneumatic tire using the composition*". The choice by the appellant of D6 as a possible starting point for analyzing inventive step, in line with the contested decision, has not been disputed by the respondent. The Board has no reason to take a different view, since as shown in above points 3 and 3.1 D6 like the patent in suit is directed to a method of preparing natural rubber masterbatches comprising carbon black, the masterbatches being indicated to provide rubber compositions suitable for tires exhibiting an improved abrasion resistance (paragraphs [0005], [0006] and [0015] of D6).

As shown in above points 3 to 3.3 the subject-matter of granted claim 1 must be considered to differ from the disclosure of D6 in that the parametric condition $0.970 \leq dc.\Sigma(\Phi i/di) \leq 0.980$ is fulfilled.

*Problem successfully solved*

5. The respondent argues in sections 62 and 64 of their reply to the statement of grounds of appeal that the rubber compositions of the present invention display an advantageous combination of rolling resistance and abrasion resistance. In accordance with the problem-solution approach the problem to be determined is that solved over or in comparison with the closest prior art, meaning that the formulation of a problem submitted by the respondent which seemingly is defined in absolute terms without any comparison with the closest prior art cannot be accepted. The question to be answered is rather whether any technical benefit or improvement in respect of the properties addressed by the respondent is brought about by the distinguishing

feature over D6, i.e. the selection of a ratio of actual density and theoretical density within the range defined in operative claim 1.

5.1 The respondent refers to the examples and comparative examples contained in the patent in suit, whose relevance is contested by the appellant. According to the established jurisprudence, if comparative tests are relied upon to demonstrate an inventive step on the basis of an improved effect, the nature of the comparison with the closest state of the art must be such that the alleged advantage or effect is convincingly shown to have its origin in the features distinguishing the invention from the closest state of the art. The applicant or patentee may in particular discharge his onus of proof by voluntarily submitting comparative tests with variants of the closest state of the art making identical the features common with the invention in order to have a variant lying closer to the invention so that the advantageous effect attributable to the distinguishing features of the invention is thereby more clearly demonstrated (Case Law of the Boards of Appeal of the European Patent Office, 9th edition, 2019, I.D.10.9, in particular T 35/85, point 4 of the reasons). However, considering that the improvement which is sought to be demonstrated by the comparative test is one which is alleged to be achieved over the closest prior art, what counts in the Board's opinion is not only whether a causal link between a distinguishing feature over the closest prior art and an effect is demonstrated in the framework of a comparative test submitted by the applicant or patentee, but also whether the variant of the closest prior art selected as reference (or comparative) example for the comparative test is representative of the closest prior art in the sense that the effect

shown to be caused by the distinguishing feature in the context of the comparative test can be expected to take place also in the framework of the closest prior art despite the existence of differences vis-à-vis the reference example of the comparative test.

5.2 The respondent submits that the tests contained in the patent in suit demonstrate that the alleged benefits are brought about by the selection of a ratio of actual density and theoretical density dc.Σ(Φi/di) within the range defined in claim 1. The experimental results contained in the patent in suit are based on Examples 1 to 9 and Comparative Examples 1 to 7.

5.2.1 As outlined by the appellant referring to section 8 of declaration D11, Comparative Examples 5 to 7 do not concern a process using a wet masterbatch like in D6, which as acknowledged in paragraph [0076] of the patent in suit is preferred in order to achieve excellent dispersion of the filler. Accordingly, Comparative Examples 5 to 7 cannot be held to be representative of the teaching of D6 and cannot be used to demonstrate any benefit allegedly obtained by the claimed rubber compositions over the closest prior art. The same is valid for Comparative Examples 1, 3 and 4 using test compositions 2 and 3 (see paragraphs [0156], [0160] and [0162] together with paragraphs [0124] to [0127]) whose preparation is more remote than that of test composition 1 of the patent in suit, as they include a drying step at 100°C for two hours of the carbon rubber masterbatch (i.e. a step which is not performed in D6). In addition test composition 3 is prepared without the coagulating step used in D6 (see paragraph [0126]). Since there is no reason to consider that these differences in processes have no influence on the resulting structure of the rubber composition,

Comparative Examples 1, 3 and 4 cannot be used for the purpose of representing the closest prior art and demonstrating in the context thereof the effect brought about by the density ratio defined in claim 1.

5.2.2 Accordingly, only a comparison between Examples 1 to 4 and Comparative Example 2 may be considered for demonstrating the purported effect (letter of the appellant of 21 August 2018, page 14, first full paragraph). Concerning the rolling resistance, a comparison of Examples 1 to 4 and Comparative Example 2 (Table 2, page 16 and Table 3, page 19 of the specification) shows that this property is not necessarily improved when the density ratio dc.Σ(Φi/di) lies within in the claimed range. This finding does not depend from the question whether higher indices mean a lower rolling resistance which is a disputed issue (appellant's letter of 21 August 2018, page 14, last paragraph), since an increase of the density ratio leads either to an increase (Example 1) or a decrease (Examples 2 to 4) of said index.

5.2.3 A comparison of Comparative Example 2 and Examples 1 to 4 shows that a density ratio dc.Σ(Φi/di) above the value of about 0.970 (the rubber composition of Comparative Example 2 exhibits a density ratio of 0.969) leads to an increase of the abrasion resistance index of about 5 to 10%, although the results are erratic, i.e. a density ratio dc.Σ(Φi/di) of 0.970 in the context of the experimental report at most represents a threshold value above which the abrasion index is improved, although no pattern between the abrasion resistance index and said density ratio can be discerned from Examples 1 to 4.

5.2.4 As to the question whether the improvement of the abrasion resistance index above a threshold value of the density ratio dc.Σ(Φi/di) of 0.970 can be expected to take place also in the framework of the closest prior art, there is no indication, let alone any evidence submitted in this respect, that the rubber composition obtained in Comparative Example 2 of the patent in suit is representative of the rubber compositions disclosed in D6, or that the model developed in the patent in suit, which is based on the parameter density ratio dc.Σ(Φi/di) and an alleged correlation between values of that parameter and the abrasion resistance, retains validity in the context of D6. As noted by the appellant the theoretical density is defined with an accuracy of 3 digits after the decimal point, whereas the density of the various components set or measured for calculating the theoretical density is defined with an accuracy of only 2 digits after the decimal point, meaning that the approximations which have to be made in respect of the density value taken for each of the components of the rubber composition have an influence on the third digit after the decimal point of the theoretical density, whereas the actual density which is a measured value is independent from such approximations. In these circumstances, in the absence of further evidence or a technical explanation, there is no reason to expect that a threshold value of 0.970 for the density ratio dc.Σ(Φi/di) or a range of values from 0.970 to 0.980 when applied in the context of D6 would necessarily coincide with an improvement of the abrasion resistance. The alleged improvement of abrasion resistance obtained vis-à-vis the closest prior art is therefore speculative.

5.3 Accordingly, the alleged technical benefits or improvements cannot be taken into consideration in respect of the determination of the problem successfully solved by the subject-matter of claim 1 over the closest prior art, which has to be reformulated as residing in the mere provision of further rubber compositions for the production of tires.

*Obviousness of the solution*

6. It remains to be decided whether the skilled person desiring to solve the problem identified above would, in view of the disclosure of D6, possibly in combination with other prior art documents or with common general knowledge, have modified the rubber composition of D6 in such a way as to arrive at the subject matter of operative claim 1.

6.1 From the overall teaching of D6 (e.g. paragraphs [0005], [0020], [0035], [0046]) the skilled person derives that the degree of dispersion of the carbon black filler in the masterbatch rubber composition is a key factor to be considered when producing the rubber composition. The dispersion of the carbon black is preferably enhanced by drying the wet masterbatch while applying a mechanical shear stress. Means therefor are taught in paragraphs [0046] and [0063] of D6. They include an ordinary kneader, continuous kneaders being preferably used in view of industrial productivity, in particular twin-screw kneading extruders such as those manufactured by Kobe Steel (see above point 3.1).

6.1.1 Twin-screw kneading extruders manufactured by Kobe Steel are shown on page 8 of D5 which document also teaches on page 6 the use of kneading disks, kneading

disks being described in the right-hand column of that page to provide "*a kind of distribution mixing*". Other means to provide "outstanding dispersion mixing qualities" and an "homogeneous dispersion mixing" with said twin-screw kneading extruders are rotor segments (picture on the top of page 6 and right hand-column).

6.1.2 Moreover, Document D18, filed with the rejoinder of the respondent, is taken into account by the Board pursuant to the provisions of Article 12(4) RPBA 2007 (which applies in view of Article 25(2) RPBA 2020) as that document was submitted in a fair attempt to explain the meaning for the skilled person of the terms kneading blocks or kneading disks. D18 also concerns kneaders of the type recommended in D6. According to the first paragraph of the introduction on page 248 of that document dispersive mixing is achieved in twin-screw extruders by continuous kneading of material in mixing sections consisting mainly of kneading blocks. According to the same passage, acceptable levels of dispersive mixing can only be achieved if all material particles are subjected to a minimum number of passages over the high shear regions. According to the third paragraph of that page "*Kneading blocks have been used in twin-screw extruders for several decades. They are available in different geometrical forms, designed to control primarily the number of material passage over the high shear regions. The intensity of mixing is determined by the axial length of the mixing block sections, the number of kneading disks used per section, and the operating conditions, i.e. screw speed*".

6.1.3 In addition, as indicated by the appellant, D4 discloses having regard to its paragraphs [0013], [0017], [0025] and [0031] a list of kneading machines

suitable for masticating wet masterbatches of rubber and carbon black. This list includes internal mixers such as Banbury mixers and twin screw extruders.

6.2 It follows from the above that the kneading machines described in D6, D5, D18 or D4 correspond to those whose use according to paragraph [0104] to [0107] of the patent in suit is suitable to obtain the state of dispersion of the filler in the rubber compositions defined in operative claim 1 by means of the range of values of the density ratio dc.Σ(Φi/di) (see point 2 above, in particular point 2.6). This applies in particular to the preferred compositions in the patent comprising a natural rubber and carbon black (claim 3, paragraphs [0054] and [0062], examples), which correspond to the composition of D6. In the absence of any effect associated with this choice of a specific state of dispersion of the filler in the rubber composition, this state of dispersion and the related condition on the density ratio must be regarded as an arbitrary and therefore obvious choice for the skilled person faced with the problem of providing further rubber compositions for the production of tires. In the absence of any argument that such state of dispersion could not be obtained by the skilled person using the conventional means described in D6, D5, D18 or D4 and some routine experimentation, the Board concludes that the skilled person would thereby arrive in an obvious manner at rubber compositions falling within the ambit of claim 1.

6.3 The main request is therefore not allowable, as the subject-matter of its claim 1 does not involve an inventive step.

*Auxiliary requests*

7. The respondent indicated in the reply to the statement of grounds of appeal of the opponent submitted with letter of 21 December 2017 that the first to sixteenth auxiliary requests addressed in this reply corresponded to those filed before the opposition division. Those auxiliary requests which however had not been enclosed with the reply were filed with letter of 3 May 2018. In the absence of any dispute that those auxiliary requests correspond to those filed before the opposition division, the question of whether they should be taken into account by the Board is therefore to be answered having regard to the provision of the Rules of Procedure of the Boards of Appeal, in particular Article 12(4) RPBA 2007 in combination with Article 12(2) RPBA 2007, the latter stipulating that the statement of grounds of appeal and the reply must contain a party's complete case. However, neither the reply of the respondent to the statement setting out the grounds of appeal nor the letter of 3 May 2018 specify expressly how the amendments introduced are meant to overcome the various objections raised in respect of the main request. Only general statements (e.g. "the process claims are further distinguished from the processes of the prior art" or "This request more narrowly defines the invention in view of the preferred embodiments") devoid of clear analysis are present with the consequence that the first to sixteenth auxiliary requests lack substantiation. Although the lack of substantiation of the auxiliary requests was communicated to the respondent in the communication of the Board dated 12 February 2020, no additional submissions were made in this respect. Under these circumstances the first to sixteenth auxiliary requests are held inadmissible under Article 12(4) RPBA

2007 as they do not meet the requirement of Article 12(2) RPBA 2007 (Case Law, supra, V.A.4.12.5).

*Correction of the minutes*

8. Apart from the question whether the request to consider the request for correction of the minutes of the oral proceedings before the opposition division as formulated by the appellant can be considered as a proper request to correct the minutes, it is established case law that the opposition division has sole competence for such a correction (Case Law, supra, III.C.7.10.3). The Board is therefore not empowered to deal with that request.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

B. ter Heijden D. Semino

Decision electronically authenticated