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**D E C I S I O N**  
**of 16 June 1999**

**Case Number:** T 0311/95 - 3.3.5

**Application Number:** 88310332.7

**Publication Number:** 0315442

**IPC:** C09C 1/50

**Language of the proceedings:** EN

**Title of invention:**

Process and apparatus for producing improved carbon blacks and resultant product

**Patentee:**

WITCO CORPORATION

**Opponent:**

Cabot Corporation  
Degussa AG, Frankfurt - Zweigniederlassung Wolfgang -  
Zentrale Abteilung Patente

**Headword:**

Production of carbon black/WITCO

**Relevant legal provisions:**

EPC Art. 52(1), 54, 56

**Keyword:**

"Novelty (yes) - no explicit disclosure"  
"Inventive step (no) - arbitrary selection of parameters"

**Decisions cited:**

T 0409/91, T 0435/91, T 0939/92

**Headnote/Catchword:**

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Boards of Appeal

Chambres de recours

Case Number: T 0311/95 - 3.3.5

**D E C I S I O N**  
**of the Technical Board of Appeal 3.3.5**  
**of 16 June 1999**

**Appellant:**  
(Opponent 01)

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**Representative:**

-

**Respondent:**  
(Proprietor of the patent)

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**Representative:**

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**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted 22 February 1995**

rejecting the oppositions filed against European  
patent No. 0 315 442 pursuant to Article 102(2)  
EPC.

**Composition of the Board:**

**Chairman:** R. K. Spangenberg  
**Members:** A.-T. Liu  
J. H. van Moer

## Summary of Facts and Submissions

- I. The appeal is against the decision of the Opposition Division rejecting two oppositions and maintaining European patent No. 0 315 442 in unamended form.
- II. The decision under appeal was based on claims 1 to 12, with claim 1 directed to a process, claims 2 to 11 depending thereon, and independent claim 12 directed to a reactor. Claim 1 reads:

"A process for producing carbon black in a reactor, the process including generating combustion gases in a combustion zone (1), passing them to an injection zone (2), feeding feedstock oil into a linear flow of the combustion gases in the injection zone from a plurality of spaced-apart injection sites (17) to begin carbon black particle formation, and passing the flow to a reaction zone (3)

characterized in that feeding of the feedstock oil occurs in at least two independently controlled streams from the spaced-apart injection sites (23,24) of the injection zone with 10 to 60% of the total feedstock oil being fed in a first of the streams to a first segment of the linear flow and 90 to 40% thereof to a second segment of the linear flow whereby different carbon black formation reactions respectively occur in different segments of the flow of the combustion gases in the injection zone (2), to produce carbon black having controlled particle sizes and structures."

III. In the statement of grounds of appeal, the appellant (opponent 01) raised the objection that the expressions "spaced-apart injection sites" and "segments of the linear flow" in claim 1 were not clear. Furthermore, it was contended that, based on proper interpretation of the technical features thus defined, the subject-matter of claim 1 lacked novelty, inter alia with regard to the following citation:

E2 EP-A-0 206 315

In the event that the Board should accept that the claimed subject-matter was novel, the appellant also questioned the validity of the comparative tests which were to show the presence of an inventive step.

IV. The respondent argued that clarity objections under Article 84 EPC were not permissible in appeal proceedings. Further, it was asserted that the claimed invention was new and inventive as it related to a radically new process and reactor characterised by feeding the feedstock oil in at least two independently controlled streams. This would allow a simultaneous treatment of different streams of feed oil in the respective segments of the linear combustion gas flow within the reactor.

V. During the oral proceedings held on 16 June 1999, the respondent filed an auxiliary request based on a new set of claims 1 to 10 and including an amended page 6 of the description. The subject-matter of claim 1 and claim 10 of the auxiliary request differs from that of claim 1 and claim 12 of the main request, respectively, in that the injection sites are stipulated to be spaced

apart from each other longitudinally and laterally. Claims 3 and 8 of the main request have been deleted and the remaining claims renumbered correspondingly.

The wording of claim 1 of the auxiliary request thus corresponds to that claim 1 of the main request, the difference being that its characterising portion now reads:

"... feeding of the feedstock oil occurs in at least two independently controlled streams from respective spaced-apart injection sites (23,24) of the injection zone the injection sites being spaced apart from each other longitudinally and laterally with 10 to 60% of the total feedstock oil being fed in a first of the streams to a first segment of the linear flow and 90 to 40% thereof to a second segment of the linear flow whereby different carbon black formation reactions respectively occur in different segments of the flow of the combustion gases in the injection zone (2), to produce carbon black having controlled particle sizes and structures."

VI. The parties' requests were as follows:

- The appellant (opponent 01) requested that the decision under appeal be set aside and the European patent No. 0 315 442 be revoked.
- The respondent (patentee) requested that the appeal be dismissed or that the patent be maintained on the basis of the text submitted during the oral proceedings as auxiliary request.

## Reasons for the decision

### *Main request*

#### 1. *Interpretation of the claims*

In the present case, the assessment of novelty and inventive step of the claimed subject-matter can only be made after having established the correct interpretation of the technical terms "spaced apart" and "segments" used in claim 1. Therefore, it is necessary to consider the Appellant's observations concerning the clarity of these terms, although clarity objections are not a ground for opposition.

1.1. During the oral proceedings, the respondent confirmed that the expression "spaced apart injection sites" is used in the sense that:

- (i) the injection sites are spaced around the internal periphery of the reactor cross section (laterally spaced apart) or
- (ii) they are spaced along the axis of the reactor (longitudinally spaced apart) or
- (iii) they are positioned around the periphery as well as in different longitudinal locations (laterally and longitudinally spaced apart).

This interpretation is in conformity with the



description (see page 4, lines 26 to 35, and page 6, lines 21 to 23) and is thus accepted by the Board.

1.2. Also during the oral proceedings, the appellant accepted that the term "segment" clearly designates the internal cross section area of the reactor which is defined by the injection site in that reactor cross section. Thus, where the injectors are axially shifted against each other, they define two separate segments along the axis of the reactor. This is for example illustrated in Figures 3 and 4 of the patent in suit. The Board therefore accepts that this is the correct meaning of the term "segment" in the present context.

1.3. The Board further observes that it is not in dispute that the term "linear flow" used throughout the patent in suit means laminar flow.

## 2. *Novelty*

E2 relates to a process for producing carbon black in a reactor comprising means for injecting feedstock into the combustions gases from at least two spaced apart positions along the longitudinal axis of the reactor. At each of these positions, the means for introducing the carbonaceous feedstock into the reactor flowpath comprises a plurality of ports opening into the flow passage with a plurality of injectors being positioned in at least a portion of said ports (page 2, lines 8 to 29; page 4, lines 21 to 29; page 5, lines 5 to 29; page 8, lines 22 to 28; Figures 1 to 2 and claims 1, 2 and 6). Thus, the prior art injectors are spaced apart both laterally and longitudinally. Furthermore, E2 also indicates the proportion of oil which can be injected

at these different locations, for example in test run N-326 or in more general terms (Tables III to V, pages 11 to 12).

However, neither document E2 nor any of the other documents relied upon by the appellant clearly and unambiguously discloses that the combustion gas flow must be linear and that the feedstock is fed to different segments of the linear gas flow of combustion gases. Thus, the process as claimed is new.

3. *Inventive step*

3.1 E2 is considered to be the most relevant prior art teaching as it concerns the same technical field and has the highest number of technical features in common with the present process. As is clearly stated in its introductory part, E2 teaches the production of different grades of carbon black by manipulating process parameters such as the positions at which the carbonaceous feed is introduced into the reactor (page 1, lines 9 to 12, page 11, lines 28 to 29, and Tables IV to V).

3.2 According to the patent in suit, the object of the claimed invention would be to provide carbon blacks which, when used in rubber compounds for reinforcement, would impart both high resilience and high abrasion resistance properties to the resultant carbon black-containing rubber compounds (page 2, lines 3 to 5). The effect of the claimed invention would be demonstrated by the test results obtained with samples of carbon black prepared according to the claimed process, as compared to the corresponding properties of commercial

products (see Table II, pages 10 and 11). However, as has been pointed out by the appellant and not contested by the respondent, the experiments on file do not include reproductions of the teaching of E2. They are therefore inappropriate for comparison to the closest prior art products. Indeed, during the oral proceedings, the respondent has not argued that the carbon black products obtained with the claimed process are superior to or different from the products obtained according to E2. Therefore, the technical problem in respect of the closest state of the art is in fact to provide a further method for obtaining useful carbon blacks.

3.3 The respondent has reasoned that the process of claim 1 is essentially distinguished from E2 in that:

- (a) the combustion gases have a linear flow (preamble of claim 1: "linear gas flow of the combustion gases");
- (b) the feeding of feedstock at each injection site is controlled independently (characterising feature of claim 1: "feeding of the feedstock oil occurs in at least two independently controlled streams from the spaced apart injection sites");
- (c) the feedstock is injected into different segments of the linear gas flow (characterising feature of claim 1: "10 to 60% of the total feedstock oil being fed in a first of the streams to a first segment of the linear flow and 90 to 40% thereof to a second segment of the linear flow") and that

- (d) different carbon black formation reactions occur in different segments (characterising feature of claim 1: "different carbon black formation reactions respectively occur in different segments of the flow of the combustion gases in the injection zone").

The respondent has contended that, in contrast, the prior art does not teach controlling the feedstock injection of each separate stream independently or feeding each stream to a different segment of the reactor. Furthermore, the prior art process would involve turbulent flow of the combustion gases, which would prevent different reactions from taking place in different segments of the reactor.

3.4 The respondent has shown that the method according to claim 1 leads to carbon black grades useful for rubber formulations. The Board is therefore satisfied that the technical problem as stated is indeed solved by the claimed process.

3.5. In the Board's judgment, the solution proposed in present claim 1 is, however, obvious in view of the cited prior art document.

3.5.1 Concerning the flow pattern of combustion gases in E2 (compare point 2.3, feature (a)), the respondent has submitted that neither does E2 explicitly disclose a linear gas flow nor has the appellant submitted any evidence to this effect. However, he has not shown that linear gas flow is excluded from the prior art teaching. In the Board's judgment, his allegation that in E2 the gas flow must be turbulent, which was

disputed by the appellant, does not unambiguously follow from the reactor parameters and reaction conditions indicated in that document. The Board therefore concludes that the general teaching of E2 at least encompasses a process for producing carbon black involving linear combustion gas flow.

3.5.2 The Board does not concur with the respondent that the prior art process does not teach the independent control of feedstock injection at each injection site (compare point 2.3, feature (b)). On the contrary, E2 expressly describes that the percent oil fed at different positions should be varied in order to adjust the properties of the resulting carbon black products (page 9, lines 1 to 4). This can only be achieved if the injection at these different positions is controlled independently.

3.5.3 Concerning the functional feature in claim 1 requiring that different reactions occur in different segments of the reactor, the Board considers that the term "segment" (point 2.3, feature (c)) does not mean that the various segments are in any way delimited against each other by physical barriers, so that the partitioning of the reactor into segments is understood to be abstract. Therefore, the functional requirement is already met when the different longitudinally spaced apart inlets for the feed oil are arranged in "staggered" positions, so that the feed oil is in fact injected into different streams of the linear combustion gas flow. Furthermore, E2 does not require that the injectors at various longitudinal positions be strictly aligned with respect to each other. The fact that longitudinally spaced apart injectors may be in a

more or less staggered position along the reactor axis implies that formation of different reactor "segments" in the present sense is also covered by the disclosure of E2. This is not disputed by the respondent.

- 3.5.4 According to claim 1 of E2, the feature which distinguishes the process described therein from previously known processes, and is thus responsible for the indicated improvements in product quality, is the introduction of the feedstock into the hot combustion gases at longitudinally spaced apart positions (see also points 3.1 and 3.5.2 above). It follows from the above considerations that the process according to the patent in suit makes use of this general technical teaching (see the description of the patent in suit, page 4, lines 26 to 30).
- 3.5.5 In the Board's judgment, the present process thus involves a selection from process parameters encompassed by the disclosure of E2.
- 3.5.6 The respondent has argued that Article 56 EPC does not expressly require that the claimed subject-matter has to solve a technical problem. Moreover, the invention does not claim carbon black products per se. Therefore, it has been submitted that the claimed process and reactor should be regarded as inventive even though the carbon black products resulting from these processes do not show unexpected properties as compared to the closest prior art.

The Board concurs with the respondent insofar as an unexpected effect is not always a condition sine qua non for the recognition of an inventive step. However,

it does not agree with his inference that the existence of a technical problem and its solution, including the problem of proposing further solutions to known technical problems such as a further process for producing carbon blacks, is irrelevant to the issue of inventive step. In the Board's judgment, the answer to the question what a skilled person would have done in the light of the state of the art primarily depends on the goal that he sets out to achieve. In other words, the notional "person skilled in the art" is always assumed to act with some specific technical purpose in mind and not merely out of idle curiosity. This is also consistent with the generally accepted legal principle that the extent of patent monopoly should correspond to and be justified by the technical contribution to the art (see T 409/91, OJ EPO 1994, 653, points 3.3 and 3.4 of the reasons; T 435/91, OJ EPO 1995, 188, points 2.2.1 and 2.2.2 of the reasons; T 939/92, OJ EPO 1996, 309, points 2.41, 2.4.2 and 2.4.3 of the reasons). In view of this underlying general legal principle, the selection of process parameters, in order to involve an inventive step, must not be arbitrary but must be justified by a hitherto unknown technical effect which is caused by those process features which distinguish the claimed process from the numerous other possible processes within the general teaching provided by E2.

- 2.5.7 In the present case, since the result is only seen in obtaining a further (modified) process, all the process parameters encompassed by E2 would be equally suitable candidates for the desired process modification. As a consequence, all these process modifications are equally suggested to the skilled person as being suitable for solving the present technical problem. No

inventive skill needs to be exercised in selecting, for instance, a linear combustion gas flow, unless this selection unexpectedly solved an additional technical problem. Such additional problem could be seen in an improvement of the process itself, for example by an unexpected energy saving, or in an improvement of the properties of the resulting products. The respondent, however, has not argued, let alone proved, that such an additional problem is solved by the process as claimed or, in other words, that the selection yields results which are unexpected in view of the general teaching according to E2.

#### *Auxiliary request*

As is already stated above, E2 also discloses laterally and longitudinally spaced apart injection sites. As a consequence, the factual situation in respect of this auxiliary request is exactly the same as the one concerning the main request. The arguments leading to the findings of lack of inventive step for claim 1 of the main request thus apply *mutatis mutandis* to the subject-matter of present claim 1. The subject-matter of claim 1 of the auxiliary request therefore is not considered to involve an inventive step.

#### **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

S. Hue

R. Spangenberg