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# D E C I S I O N
## of 30 August 2001

**Case Number:** T 0278/99 - 3.2.4

**Application Number:** 92307951.1

**Publication Number:** 0539003

**IPC:** B65H 3/06

**Language of the proceedings:** EN

**Title of invention:**
Elastic roller

**Patentee:**
SUMITOMO RUBBER INDUSTRIES LIMITED

**Opponents:**
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Hokushin Corporation
Manfred Kirchhoff technische Beratung

**Headword:**
EPDM rubber roller/SUMITOMO

**Relevant legal provisions:**
EPC Art. 56

**Keyword:**
"Inventive step (no)"

**Decisions cited:**
-

**Catchword:**
-

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**Case Number:** T 0278/99 - 3.2.4

# D E C I S I O N
## of the Technical Board of Appeal 3.2.4
## of 30 August 2001

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| **Respondent:** (Proprietor of the patent) | SUMITOMO RUBBER INDUSTRIES LIMITED<br>1-1 Tsutsui-cho 1-chome<br>Chuo-ku<br>Kobe-shi<br>Hyogo-ken (JP) |
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**Decision under appeal:** **Interlocutory decision of the Opposition Division of the European Patent Office posted 15 January 1999 concerning maintenance of European patent No. 0 539 003 in amended form.**

**Composition of the Board:**

**Chairman:** C. A. J. Andries
**Members:** P. Petti
C. Holtz
P. Kitzmantel
H. Preglau

## Summary of facts and submissions

I. The European patent No. 539 003 results from the European patent application No. 92 307 951.1 filed on 2 September 1992. Three oppositions based *inter alia* upon Article 100(a) EPC were filed against this European patent.

The opposition division by its interlocutory decision dispatched on 15 January 1999 maintained the patent in amended form on the basis of Claim 1 filed with the letter dated 1 October 1996.

II. Opponent II (hereinafter appellant I) lodged an appeal against this decision on 16 March 1999, paid the appeal fee on 23 March 1999 and filed a statement setting out the grounds of appeal on 25 May 1999.

Opponent III (hereinafter appellant II) lodged an appeal against this decision on 15 March 1999 and simultaneously paid the appeal fee. A statement setting out the grounds of appeal was received on 17 May 1999.

III. With the communication pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal dispatched on 30 April 2001, the board expressed doubts as to whether some features specified in Claim 1 filed with the letter dated 1 October 1996 could be detected on an elastic roller as defined by this claim.

IV. Oral proceedings were held on 30 August 2001.

During the oral proceedings the patent proprietor (hereinafter respondent) filed two independent Claims 1 upon which a main and an auxiliary request were based.

Claim 1 according to the main request reads as follows:

"1. An elastic roller for use in a paper feed operation containing EPDM rubber as a main component characterised in that the EPDM is oil extended and has a friction coefficient of not less than 2 with respect to ordinary paper and a hardness of not more than 35°, and in that the raw rubber Mooney viscosity is the EPDM rubber which is a main component is not less than 50 ($ML_{1+4}$ @ 100°C), as obtained when the amount of process oil added as oil extension of the EPDM rubber which is a main component is 100 parts by weight of process oil per 100 parts by weight of rubber."

Claim 1 according to the auxiliary request reads as follows:

"1. An elastic roller for use in a paper feed operation containing EPDM rubber as a main component characterised in that the EPDM rubber is oil extended and has a friction coefficient of not less than 2 with respect to ordinary paper and a hardness of not more than 35°, and in that the raw rubber Mooney viscosity of the EPDM rubber which is a main component is not less than 50 ($ML_{1+4}$ @ 100°C) as obtained when the amount of process oil added as oil extension of the EPDM rubber which is main component is 100 parts by weight of process oil per 100 parts by weight of rubber, and the 10-point average roughness of the surface of the roller is 10-50µm."

V. The appellants argued *inter alia* that the subject-matter of Claim 1 of the main request as well as of the auxiliary request did not involve an inventive step having regard to the article of Y. Itoh et al,

*"Problems in the design of paper feed rolls"*, in *"International Polymer Science and Technology"*, Vol. 14, No. 2, 1987, pages T/42 to T/53 (document D1) and to the document JP-A-62-257947 (D4), for which an English translation (document D'4) had been filed.

VI. Both appellants requested that the decision under appeal be set aside and that the patent be revoked.

The respondent requested that the decision under appeal be set aside and that the patent be maintained on the basis either of Claims 1 and 2 filed during the oral proceedings and designated as the main request or of Claim 1 filed during the oral proceedings and designated as the auxiliary request.

## Reasons for the decision

1. *The appeal is admissible*

2. *The claimed subject-matter*

2.1 Claim 1 of the patent as granted was directed to **an elastic roller** having the following features:

(A) the roller is suitable for use in a paper feed operation;

(B) the roller contains EPDM rubber as a main component;

(C) the EPDM rubber has a friction coefficient of not less than 2 with respect to ordinary paper;

(D) the EPDM rubber has a hardness of not more than 35°.

2.1.1 Feature B refers to EPDM rubber as "a main component".

With respect to the expression "as a main component", the respondent argued that EPDM rubber has to be considered as the main **rubber** component. The appellants argued that this expression could also be interpreted as defining EPDM rubber as being one of the main components of the elastic roller. The board considers that both these interpretations of feature B are possible. In this respect, it has to be noted that the description and the drawings of the patent do not contain elements which support one interpretation more than the other and are not inconsistent with either of these interpretations.

2.1.2 Feature C literally refers to the "friction coefficient of the EPDM rubber". It has to be understood that the friction coefficient meant by feature C relates to the roller, in particular to the roller surface. This interpretation is consistent with the description of the patent in so far as according to the description of the patent "it is required that the elastic roller should have a high friction coefficient so that it does not slip relative to the paper" (see column 1, lines 26 to 28). Moreover, the description of the patent also refers to the relation between **roller surface** roughness and friction coefficient (see Figure 11; column 6, lines 38 to 47) and to a method of measurement of friction coefficient according to which paper is pressed against an elastic **roller** (see Figure 13; column 7, lines 2 to 9).

2.2 Claim 1 of the main request specifies not only features A to D above but also the following additional features:

(E) the EPDM rubber is oil extended;

(F) the raw rubber Mooney viscosity of the EPDM rubber which is a main component is not less than 50 ($ML_{1+4}$ @ 100°C), as obtained when the amount of process oil added as oil extension of the EPDM rubber which is a main component is 100 parts by weight of process oil per 100 parts by weight of rubber.

2.2.1 The term "oil extended EPDM rubber" is understood as relating to a raw EPDM rubber having **process oil** added thereto. The terms "oil extended rubber" or "oil extension" are mentioned in the description of the patent (column 5, lines 9 and 10) and in the tables according to Figures 2 and 3. It is clear that these terms relate *inter alia* to the EPDM **raw** rubbers F, G and H referred to in the table according to Figure 3. Furthermore, it has to be noted that Figure 2 refers to **various** EPDM rubbers (see column 3, lines 6 to 8). Rubbers E and F in Figure 2 as well as rubbers F to H in Figure 3 are oil extended, while rubbers A to D in Figure 2 as well as rubbers A to E in Figure 3 are not. It is understood that the term "oil extended EPDM rubber" defines a quality of the raw EPDM rubber used to manufacture the roller. In other words, it has to be assumed that the presence of process oil in the raw rubber can be detected by analysing the final product.

On the other hand, it is clear from the description of the patent that a softening agent is used to decrease the hardness of the EPDM rubbers as a further additive, together with carbon black and fillers such as silica or clay. As a softening agent a **process oil**, such as Diana Process Oil PW-90 (see column 4, lines 15 and 16 and column 5, lines 49 to 55) can be used. In other words, process oil can be further added to the raw

rubber (which is already oil extended) for other purposes, wherein the presence of process oil as a softener in the preparation can also be detected by analysing the final product.

With respect to the difference between process oil used as "extension oil" in the raw EPDM rubber and process oil used as "softener" in a later processing step, the appellants argued that it would not be possible to distinguish between these "process oils" in the final product to which Claim 1 is directed.

Furthermore, it has to be noted that the board in the communication dispatched on 30 April 2001 (see section III above) expressed doubts as to whether the analysis of the final product allows the effects of the oil used as extension oil in the raw rubber to be distinguished from those of the oil added as softener in the preparation, but that the respondent did not provide any relevant evidence in this respect.

Therefore, when comparing the claimed subject-matter with the prior art, it has to be assumed that process oil used as extender cannot be distinguished from process oil used as softener.

2.2.2 The Mooney viscosity value results from a test on raw rubber or on unvulcanised mixes. According to feature F, the Mooney viscosity relates to the raw EPDM rubber.

With the communication dispatched on 30 April 2001 (see section III above), the board stated that feature F does not characterize the final product but the raw EPDM rubber used to manufacture the final product and expressed doubts as to whether this feature could be

established on the vulcanised roller. The respondent did not provide any evidence that feature F is detectable from the claimed roller.

Thus, feature F cannot be taken into consideration when comparing the claimed subject-matter with the prior art.

2.3 Claim 1 of the auxiliary request specifies not only features A to F above but also the following additional feature:

(G) the 10-point average roughness of the surface of the roller is 10-50 µm.

3. *The prior art*

3.1 Document D1 refers to problems in the design of paper feed rolls. It can be derived from this document that elastic rollers for use in a paper feed operation which contain EPDM rubber as a main component and have a hardness of 30° (JIS A) are known (see particularly Table 2 on page T/44).

Moreover, document D1 indicates that a rubber which has low hardness has a high coefficient of friction (see page T/44, left-hand column, sixth and fifth last lines).

With respect to the coefficient of friction of the paper feed rolls, this document makes it clear that the factors affecting this characteristic are "Rubber material", "Rubber hardness", "Surface roughness (roughness, state of the surface)" and "Surface condition (surface ageing, contamination)", see Table 3 on page T/45. Furthermore, with respect to the surface

roughness, document D1 indicates that the 10-point average roughness of the surface is "generally of the order of 5 to 20 µm" (see page T/44, right-hand column, seventh and sixth last lines).

3.2 Document D'4 (ie document D4) discloses a rubber composition for rollers, comprising a strengthened rubber composition A, an ethylene-propylene copolymer rubber B and an anti-oxidizing agent (see page 2, Claim 1) as well as a process for manufacturing rollers using said composition (see page 15, 5th paragraph to page 16. 1st paragraph). According to a passage on page 17 (2nd paragraph) the composition makes it possible to manufacture a rubber roller having a hardness of 30° (JIS A).

Document D'4 refers to 13 examples and to 10 comparative examples using the above mentioned composition.

According to tables 4 to 7, only example 13 has a hardness 30. This example (see page 27) corresponds to Example 4, ie it corresponds to a rubber roller containing 80 parts of the strengthened rubber composition $A_2$, 20 parts of the copolymer rubber $B_3$ and 4 parts of short-fibrous material. This example furthermore contains 80 parts of softening agent and 20 parts of inorganic filler (see Tables 1, 2, 4 and 7 on pages 18, 19, 23 and 28)

According to the description of document D'4 (pages 17 and 18) the strengthened rubber composition $A_2$ contains EPDM rubber, while the copolymer composition B contains EPM rubber. Having regard to the data in Tables 1, 2, 4 and 7 the EPDM rubber can be considered as being the

main component of the rubber roller according to Example 13, not only as the main **rubber** component but also as one of the main components (see section 2.1.1 above).

According to Table 7 and to the footnote (1) of Table 5, the softening agent is a paraffinic process oil denominated "Sanbar 110" which is added to the compositions A and B and kneaded in a mixer. This implies that process oil can be detected in the vulcanised roller. Having regard to the comments in section 2.2.1 above, it can assumed that the roller according to document D4 (example 13) is provided with feature E.

4. *Novelty*

The subject-matter of both Claims 1 (main and auxiliary request) is novel (Article 54 EPC) with respect to the cited prior art.

Novelty was only disputed with respect to document D4. In particular, the claimed subject-matter is novel with respect to this document, because no information concerning the friction coefficient of the roller with respect to paper can be derived from document D'4.

5. *Inventive step*

5.1 Having regard to the comments in the above sections 2.1, 2.2 and 3.2, feature C is the only feature permitting the subject-matter of Claim 1 of the main request to be distinguished from the roller known from document D4 (example 13).

The subject-matter of Claim 1 of the auxiliary request differs from the prior art known from document D4 (example 13) not only by feature C but also by feature G.

These findings were agreed with by the respondent during the oral proceedings.

5.2 Having regard to features C and G, the problem to be solved is to provide an elastic roller having such a friction coefficient that it does not slip relative to paper.

5.3 Document D4 is silent with respect to the friction coefficient as well as with respect to the surface roughness of the roller. This document, however, provides information concerning two important factors affecting the coefficient of friction of the roller, namely the rubber material and the rubber hardness, in so far as it refers to the roller as containing EPDM rubber as a main component (feature B) and as having a JIS-A hardness of 30° (feature D).

The skilled person, when concerned with the problem of providing a roller having an appropriate friction coefficient, would turn to document D1 which explicitly refers to the factors controlling the friction coefficient and their contribution. This document (see section 3.1 above) would lead the skilled person to work on the coefficient of friction and in particular on the surface roughness of the roller. On the other hand, the skilled person wanting to use a roller according to example 13 of document D4 has still to fill the gap left open by the disclosure of document D4, ie he has at least to decide which surface roughness has to be used, so that he can define the production process of the roll.

5.3.1 With respect to Claim 1 of the main request, the following has to be noted:

Feature C only represents the choice of a range for the coefficient of friction (≥ 2). This choice defines a desired result without indicating how this result is achieved.

It would be obvious for a skilled person, still having to define a surface roughness, to arrive a this range, for instance by routine trial and error.

Moreover, Figure 4 on page T/45, which shows a graph representing the fall in coefficient of friction due to the ageing of the rubber, indicates for a roller of EPDM rubber a value of the coefficient of friction which is over 2. Therefore, no surprising effect can be attributed to such a range, so that it has to be considered as being obvious.

5.3.2 With respect to Claim 1 of the auxiliary request, the following has to be noted:

Feature G clearly refers to the rubber roughness as a decisive factor determining - in combination with the rubber material and the rubber hardness - the desired range of values of the coefficient of friction. In other words, the choice of the range for the rubber roughness as defined by feature G results in the desired range for the coefficient of friction.

As already indicated, it is clear for the skilled person that this range can easily be arrived at by routine trial and error.

Moreover, document D1 - in so far as it indicates that the surface roughness of the rubber roller "measured as a 10 point average is generally of the order of 5 to

20 µm" - also gives the skilled person a range of values which - for the largest part of this range (namely from 10 and 20 µm) - overlaps the claimed range (10 to 50 µm).

5.4 Having regard to the comments above, it would be obvious for a skilled person - starting from a roller according to document D4 (example 13) and trying to increase the friction coefficient so as to avoid slipping between rubber and paper and anyway still having to define a roller surface roughness - to carry out simple tests in order to choose the claimed ranges for the rubber roughness and for the coefficient of friction as defined by features G and C.

Therefore, the subject-matter of Claim of the auxiliary request and - *a fortiori* - that of Claim 1 according to the main request lack the inventive step required by Article 56 EPC.

6. Therefore, the patent has to be revoked.

## Order

## For these reasons it is decided that:

1. The decision under appeal is set aside.

2. European patent No. 0 539 003 is revoked.

The Registrar: The Chairman:

G. Magouliotis C. Andries