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D E C I S I O N
of 22 June 1994

Case Number: T 0046/92 - 3.4.2

Application Number: 81109362.4

Publication Number: 0052809

IPC: G01M 17/02

Language of the proceedings: EN

Title of invention:
Apparatus for measuring tire uniformity

Patentee:
Kabushiki Kaisha Toyota Chuo Kenkyusho

Opponent:
Gebr. Hofmann GmbH & Co. KG Maschinenfabrik

Headword:
-

Relevant legal norms:
EPC Art. 56

Keyword:
"Inventive step - confirmed"

Decisions cited:
-

Catchword:
-

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Case Number: T 0046/92 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 22 June 1994

Appellant: (Opponent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office dated 11 September 1991, posted 29 October 1991 concerning maintenance of European patent No. 0 052 809 in amended form.**

Composition of the Board:

Chairman: C. Black
Members: M. Chomentowski
M. Lewenton

Summary of Facts and Submissions

I. European patent No. 0 052 809 was granted on the basis of European patent application No. 81 109 362.4.

II. The opposition to the granted patent by the present Appellant was rejected by decision of the Opposition Division dated 26 April 1989.

III. An appeal (T 638/89) was filed against this decision. The Appellant relied in the grounds for the appeal solely on the document DE-A-1 648 435 (M) which had not been previously cited in the examination or opposition proceedings. In view of the apparent relevance of this document, the Board decided to remit the case to the Opposition Division for continuation of the opposition procedure taking document M into account.

IV. The decision of the Opposition Division was to maintain the patent in amended form, and the present appeal by the Opponent lies against this decision.

V. Oral proceedings were appointed at the auxiliary request of both parties; the Appellant subsequently withdrew the request and notified the Board that he would not attend if the proceedings were held. Accordingly only the Respondent was present at the proceedings.

VI. The Appellant requests that the decision under appeal be set aside and the patent revoked. The Respondent requests that the appeal be dismissed.

VII. Claim 1, the only independent claim, now under consideration reads as follows:

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"A tire uniformity measuring apparatus comprising

(a) a drum (11, 21, 31) contacting a tire (T) to be measured;

(b) a rotatable shaft (12, 22, 32) having an attachment for securing the tire in position;

(c) a drive source (M);

(d) a load applying means (14, 24, 34) for applying a predetermined load directly on the tire by a movement of said drum for changing an interaxial distance between said drum and rotatable shaft;

(e) a movable member (13, 23) being movable about a fulcrum being rigidly supported on the measuring apparatus in response to a force acting between said drum (11, 21, 31) and the tire (T) to be measured;

(f) a displacement detecting means (15, 25, 35) for detecting a displacement of said movable member dependent on a variation in a load applied radially to the tire while the latter is rotated by said drum and

(g) display means (16, 26, 36) for displaying the variation in the load applied radially to the tire in response to the displacement of said movable member,

c h a r a c t e r i z e d in that

(h) said movable member (13, 23) has a part rotatably and coaxially supporting said rotatable shaft (12, 22, 32),

(i) said drum (11, 21, 31) is rotatively driven by the drive source (M) and rotates the tire and that

(j) the longitudinal axis of said movable member (13, 23, 33) is disposed in parallel with the rotation axis of the drum."

VIII. Other documents which have been referred to in the present appeal proceedings are:

US-A-3 661 014 (E)
US-A-3 478 581 (K)
DE-A-1 473 710 (N).

Document N was introduced by the Appellant for the first time in the grounds of appeal. The document US-A-3 375 714 (D) will also be referred to in this decision.

IX. The Appellant's argumentation may be summarised as follows:

Document M relates to an apparatus for measuring the various forces acting on a rotating tire, in particular, but not exclusively, axial forces. While load cell 17 is apparently intended to measure the preload, since this is radially applied it will respond to any radial load variation. It is therefore obvious to use it also for measuring radial non-uniformity of the tire. That the use of the same load cell for measuring preload and non-uniformity is not unusual is demonstrated by the disclosures in documents E, K and N.

The gist of the Respondent's counter-argumentation is that document M does not contemplate the measurement of radial non-uniformity, the various forces acting on the tire being restricted to axial forces, rolling resistance and preload. The load cell 17 is clearly only intended to measure the preload and the construction of the apparatus is such that the said load cell could not be used to measure radial non-uniformity.

Reasons for the Decision

1. The appeal is admissible.

2. Claim 1 now under consideration was found by the Board in appeal T 638/89 not to infringe Article 123(2) and 123(3) EPC (point 3 of the Reasons for the Decision). Since in that case the Board decided to remit the case

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to the Opposition Division, it was not necessary for the Board to investigate whether, as the result of the addition of the features "directly ... by a movement of said drum" and "being rigidly supported on the measuring apparatus" to the first part of Claim 1, the two-part formulation based on document D or E (see communication dated 9 April 1985 in the examination proceedings) remained correct. The Board can accept that this is so from an inspection of the sketches (Figures 1A and 2A) annexed to the said communication.

3. Novelty is no longer disputed (see first paragraph of the grounds for the appeal) and the only question to be answered is whether the Opposition Division was correct in finding that the subject-matter of Claim 1 involved an inventive step even when the late-filed but prima facie relevant document M is taken into account.

4. Document M discloses features (a) to (c) and (h) to (j) of Claim 1, that is to say, as can be derived from Figures 1 and 2 and the corresponding description on page 4, line 12 to page 5, line 12, drum 1 contacting tire 2, a rotatable shaft (pivot bearing 3) for securing the tire in position, drive source 5, movable member 6 having a part 3 rotatably and coaxially supporting the rotatable shaft, the drum being driven by the drum means and the longitudinal axis of the movable member being parallel to the rotation axis of the drum. Document M also discloses a load applying means for applying a predetermined load on the tire for changing an interaxial distance between the drum and the shaft, that is, part of feature (d).

5. The subject-matter of Claim 1 therefore differs from the disclosure in document M in features (e), (f) and (g) and in that in feature (d), the predetermined load is applied directly on the tire by movement of the drum.

One question to be answered is therefore whether these differences are such that the subject-matter of Claim 1 involves an inventive step over the disclosure in document M. A second question is whether the teaching of document M, disclosing features (h), (i) and (j) which constitute the characterising portion of Claim 1, might be combined with the disclosure of documents (D) or (E) corresponding to the first part of Claim 1.

6. As regards the first of these questions, document M does not disclose the means for applying a load directly on the tire by a movement of the drum, but rather a load 15 is applied by means of intermediate member 16, load cell 17 and a circular cross-sectioned member to the movable member 6. This construction enables axial movement of member 6 when the load is applied and as will be seen it is axial non-uniformity of the tire that the apparatus disclosed in document M seeks to measure.

Feature (e) requires that the movable member is movable about a fulcrum which is rigidly supported on the measuring apparatus in response to a force acting between the drum and the tire. In document M movable member 6 is supported by pivot joints 7, 8 mounted in roller bushings 18. To the extent that this arrangement may be termed a fulcrum, it is not rigidly supported on the apparatus, but the joints are axially displaceable, again because document M seeks to measure axial non-uniformity. According to feature (f) a displacement detecting means is for detecting a displacement of the movable member dependent on a variation in a load applied radially to the tire while the latter is rotated by said drum. In document M load cells 10, 11 measure axial displacement of the movable member 6 in response to axial non-uniformity. As regards load cell 17, the Board can agree with the Opposition Division and the Respondent that this is intended to measure the preload

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effected by force 15 and that the load variations referred to on page 5, line 11 refer to variations from tire to tire when a plurality are to be tested in sequence. In particular the Board can agree that had measurement of radial non-uniformity in an individual tire been intended, the expression "am Rad" would have been used on page 5, line 10 rather than "auf das Rad". This is in effect acknowledged by the Appellant on page 2, lines 17 et seq of the grounds for the appeal. The Appellant argues however that it would be obvious to use load cell 17 also for measuring radial non-uniformity in a tire.

It is true that as a consequence of the radially directed force 15 there will be a radial force acting between the drum and the tire. The aim of this, in conjunction with stop means 13, is to ensure a specific depth of impression of the tire on the drum (page 5, lines 7 to 10). However the amplitude of radial variations in the tire is an order of magnitude lower than the amplitude of preload variations which load cell 17 is intended to measure. While it is not disputed that the same load cell might be adapted so that both types of variation could be measured, no such adaptation is disclosed or suggested in document M.

Document M indeed refers to means for measuring the various forces acting on the wheel or tire (introductory part of the description) but these can be accounted for by the ones actually mentioned, that is axial non-uniformity, rolling resistance and preload variation.

Moreover the fact that the preload is applied, not directly on the tire, but on the movable member and at a variable point thereon points to the unsuitability of the arrangement including load cell 17 for measurement of radial non-uniformity, because the measurements would

thereby be distorted. Further, as pointed out by the Appellant, radial non-uniformity of the rotating tire could in extreme cases lead to separation of the movable member 6 from the load applying means 15, 16, 17 or separation of the intermediate member 16 from the stop means, in either case leading again to distortion of the measurements.

7. In the Board's opinion therefore the answer to the first question (paragraph 5 above) is that the differences between the construction and mode of action of the claimed apparatus and the one disclosed in document M are such that the subject-matter of Claim 1 involves an inventive step over document M.

8. The same conclusion applies in respect of the second question. As stated above, features (h), (i) and (j) forming the characterising portion of Claim 1 are known from document M, and the first part of Claim 1 from documents D or E. As compared with documents D or E, the characterising portion requires in effect driving the drum instead of the tire, turning the drum and tire axes through 90° and supporting the rotatable shaft of feature (b) coaxially on a part of the moving member. However, as explained above, document M is not seen as disclosing or suggesting an apparatus for measuring radial non-uniformity, so that the average person has no reason to combine its teaching with that of documents D or E, let alone to extract the said features, admittedly to some extent interlinked, from the teaching of document M as a whole, with a view to improving or modifying the apparatus disclosed in documents D and E.

9. The Appellant cited documents E, K and N with a view to demonstrating that it would be obvious to use the same load cell for different measurements. The Respondent questioned the Appellant's interpretation of these

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documents in this respect and the Board in the communication accompanying the summons to oral proceedings expressed the provisional view that the Respondent's arguments could be followed. However, since the Board does not dispute the possibility of using the same load cell for different measurements (paragraph 6 above), this need not be gone into further.

10. Although document M contains many of the features of Claim 1, in the Board's view the present formulation under Rule 29(1) is at least as logical and no amendment in this respect is required.

11. Accordingly the grounds for the appeal do not prejudice the maintenance of the patent in amended form.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana C. Black