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D E C I S I O N
of 3 December 2004

Case Number: T 0352/03 - 3.2.1

Application Number: 97202112.5

Publication Number: 0822103

IPC: B60C 9/22 // B60C 103:04

Language of the proceedings: EN

Title of invention:

High-transverse-curvature tire, in particular for use in front wheels of motor-vehicles

Patentee:

PIRELLI PNEUMATICI SOCIETA' PER AZIONI

Opponent:

Dunlop Tyres Ltd

Headword:

-

Relevant legal provisions:

EPC Art. 56, 114(2)

Keyword:

"Inventive step - yes"

"Late submitted material - document admitted (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 0352/03 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 3 December 2004

Appellant:
(Opponent)

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Representative:

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Respondent:
(Proprietor of the patent)

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Representative:

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Decision under appeal:

Interlocutory decision of the Opposition
Division of the European Patent Office posted
15 January 2003 concerning maintenance of
European patent No. 0822103 in amended form.

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
S. U. Hoffmann

Summary of Facts and Submissions

I. The opponent's appeal is directed against the decision posted 15 January 2001 according to which it was found that, account being taken of the amendments made in the second auxiliary request presented by the patent proprietor during the opposition proceedings, the European patent No. 0 822 103 and the invention to which it relates meet the requirements of the EPC.

II. The following prior art evidence from the opposition proceedings played a role during appeal:

D5: EP-A-0 718 122

D7: US-A-5 358 020

D12: JP-U-62-174905 and translation into English.

III. During oral proceedings held 3 December 2004 the appellant requested that the decision under appeal be set aside and that the patent be revoked. The respondent requested that the appeal be dismissed (main request) or in the alternative that the patent be maintained on the basis of the set of claims filed as an auxiliary request with a letter dated 3 November 2004.

IV. Claim 1 according to the respondent's main request and which is identical to that according to the second auxiliary request in opposition reads:

"A tire for two-wheeled vehicles having a curvature ratio not lower than 0.3, comprising:

- a carcass structure (2) of toric form having a high transverse curvature and provided with a central crown portion (16) and two sidewalls ending in a couple of beads (15) for anchoring onto a corresponding mounting rim;

- a belt structure (6), circumferentially inextensible, coaxially extended around the carcass structure (2);

- a tread band (8) coaxially extended around the belt structure (6) and comprising a plurality of rubber blocks (10) defined between a plurality of grooves (11) extending along a direction substantially transverse to the running direction of the tire, said grooves (11) comprising a bottom (12) connected to opposite inlet and outlet sidewalls (13 and 14) extending substantially perpedicularly (*sic*) to said bottom (12); said belt structure (6) comprises at least a radially external layer (9a) including a plurality of circumferential coils (7a), axially arranged side by side, of a cord (7) wound at a substantially zero angle with respect to the equatorial plane (X-X) of the tire; characterized in that:

a) said tire is a front tire;

b) the area occupied by said rubber blocks (10) in a portion of the tread band (8) having a length equal to a pitch (p) of the tread pattern and a width equal to the axial development of the tread band (8) is between 70% and 90% of the total area of said portion;

c) in an equatorial zone (E) of the tread band (8) the outlet side wall (14) of said grooves (11) is inclined with respect to said bottom (12) towards a direction opposite to the rolling direction of the tire and forms

with respect to a plane (π) tangent to said bottom (12) an angle (α') of from 100° to 130° ; and in that

d) at opposite side zones (F, G) of the tread band (8), external to said equatorial zone (E), said angle (α') linearly decreases according to the chord of the tire down to a minimum value of from 90° to 100° ."

Claim 1 is followed by dependent claims 2 to 27 which relate to features additional to those of claim 1.

V. According to the contested decision the subject-matter of claim 1 according to the then main request, essentially that of the preamble and characterising features (a) and (b) of the above claim, did not involve an inventive step in the light of D5 and D7.

VI. The appellant's submissions in respect of the respondent's main request may be summarised as follows:

The Opposition Division was correct to find that the subject-matter of claim 1 according to the then main request did not involve an inventive step. Present claim 1 contains the additional features (c) and (d) which still fail to render the subject-matter of the claim inventive.

The closest prior art is the disclosure of D5. Feature (a) of present claim 1, that it is a front tyre, is already disclosed in D5 figure 1 which shows a non-schematic cross-sectional profile of a motorcycle tyre having a curvature ratio of not less than 0.3; according to the respondent's own definition this would be considered to be a front tyre. Moreover, it was

known before the priority date to build motorcycle front tyres using a zero degree angle belt structure and there existed no technical prejudice in this respect at the priority date. Feature (b), relating to the portion of the tread area occupied by the rubber blocks, defines a very broad range encompassing values which were already known.

Features (c) and (d) exhibit no synergy with the respective features (a) and (b). D12 discloses essentially the same features (c) and (d) but for the groove inlet side walls of a motorcycle rear tyre, whereby the grooves are adapted to acceleration forces. The skilled person would appreciate that in the case of a front tyre the oppositely directed braking forces would require a corresponding angular arrangement of the outlet side wall.

VII. The respondent rebutted these submissions essentially as follows:

The features contained in the characterising portion of claim 1 do exhibit a true combinatory effect in as far as they all interact to solve the problem of improving wear resistance and grip. There is no indication in D5 that figure 1 is to scale. According to case law drawings in patent documents can be measured only under particular conditions which are not fulfilled in D5. Anyway, a curvature ratio of around 0.3 is applicable to both front and rear tyres. Substantial evidence on file supports the respondent's contention of a technical prejudice against building a front tyre with a zero degree belt layer.

It is not contested that feature (b) is shown in D7.

The appellant's arguments in respect of D12, however, are based on hindsight. There is no mention in D12 of front tyres and, moreover, no disclosure of the linear variation specified in feature (d) of claim 1.

Reasons for the Decision

Main request

1. It is undisputed between the parties that D5 discloses the features contained in the preamble of claim 1. D5 relates in particular to a high transverse curvature tyre having an essentially zero degree angle belt cord laid on an auxiliary layer which stabilises the cord during manufacture. It is stated in D5 that although the construction would be advantageous in any type of tyre it was conceived in particular for tyres of high-performance motorcycles and that it influences the slip thrust offered by the tyre under drift. D5 is silent as regards the form of the tread.
- 1.1 There is no explicit disclosure in D5 of a front tyre. Even if the cross-sectional view of the tyre illustrated in figure 1 were to correctly represent the proportions of the tyre, the value of the transverse curvature ratio of about 0.3 derivable by measurement would not clearly and unambiguously identify it as a front tyre. Equally, the references in D5 to the effects of the auxiliary layer on the performance of the tyre allow no better conclusions to be drawn. It

- follows that, contrary to the view of the appellant, feature (a) of claim 1 is not disclosed by D5.
2. The subject-matter of claim 1 differs from that of D5 by the characterising features. Whilst the Board is in agreement with the finding of the Opposition Division that the features (a) and (b) do not involve an inventive step, the Board considers, as set out below, that the additional features (c) and (d) are not derivable in an obvious manner from the cited prior art.
 3. Features (c) and (d) relate to the cross-sectional shape of a substantially transverse groove in a tread pattern of a motorcycle tyre, in particular to the angle of inclination of the outlet side wall of the groove. According to the specification of the contested patent an inlet side wall of a groove is defined as the one which first approaches the ground during rotation of the tyre in its intended direction. The outlet side wall is the opposing one which approaches the ground only after further rotation of the tyre. The angles of the inlet and outlet side walls in the cross-section of the groove influence the wear pattern of the corresponding shoulders of the tread blocks in response to oppositely directed high frictional forces during acceleration and braking respectively. The rear tyre of a motorcycle may be subject to high acceleration forces but only relatively low braking forces, resulting in irregular wear predominantly on the shoulders of the blocks adjacent the inlet side walls of the grooves. The subject-matter of the present claim, on the other hand, is a front tyre for a motorcycle which may be subject to high braking forces but not to acceleration forces, resulting in irregular wear on only the

shoulders of the blocks adjacent the outlet side walls of the grooves. Moreover, it is implicit from the term "outlet side wall" that the claim relates to a directional tyre which cannot be reversed to provide for more even distribution of wear.

3.1 D12 relates to the cross-sectional shape of a transverse groove in a directional tread pattern of a motorcycle tyre, in particular to the angle of the inlet side wall of the groove. It is implicit from the fact that D12 occupies itself solely with the angle of the inlet side wall that it relates not to a front tyre but to a rear tyre. Moreover, it is clear from the paragraph bridging pages 2 and 3 of the translation of D12 that it concerns itself with the effects of acceleration forces. The solution taught by D12 is that the inlet side wall of the groove should be within a particular range in an equatorial zone of the tread band and gradually change as it approaches the shoulder portions.

3.1.1 The appellant argues that the skilled person would appreciate that the features applicable according to D12 to the inlet side wall of a rear tyre should be applied to the outlet side wall of a front tyre. The Board cannot agree. D12 in its discussion of prior art mentions irregular wear resulting from deformation of the tread blocks during both acceleration and braking. It also refers to a prior art document which provides for greater inclination of the groove side walls but at an angle which is constant across the tread width and which therefore does not take into account that the greatest wear during acceleration occurs in the centre. In addressing both of these problems and despite the

author of D12 having discussed an aspect of the problem of irregular tyre wear resulting also from braking forces, the teaching is clearly restricted to a rear tyre and the wear pattern which results from acceleration forces. In the Board's view the appellant's argument that it would be obvious to adapt this teaching for application to a front tyre results from an *ex-post* consideration of the matter.

- 3.1.2 D12 refers to a previous prior art document (JP-A-53-100503) which the appellant attempted to introduce into the appeal procedure during the oral proceedings and which was disregarded by the Board in accordance with Article 114(2) EPC. That document is not relevant to the outcome of the present case because, although it discloses unequal angles for the two groove side walls, the teaching is directed neither to a front tyre nor to a directional tyre.
- 3.2 In the light of the foregoing the Board finds that it was not obvious for the skilled person having adopted the construction according to D5 for a front tyre to provide also the features (c) and (d) since, in objective terms, there is nothing in the state of the art which can be seen as suggesting this. The subject-matter of claim 1 therefore involves an inventive step (Article 56 EPC). Since claims 2 to 27 contain all features of claim 1 this conclusion applies equally to those claims. Under these circumstances consideration of the respondent's auxiliary request is not necessary.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

A. Vottner

S. Crane