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**Datasheet for the decision
of 2 October 2018**

Case Number: T 1120/14 - 3.2.06

Application Number: 07001076.4

Publication Number: 1947003

IPC: B62M11/16

Language of the proceedings: EN

Title of invention:

Hub transmission for a bicycle and method for shifting such a
hub transmission

Patent Proprietor:

SHIMANO INC.

Opponent:

SRAM Deutschland GmbH

Headword:

Relevant legal provisions:

EPC 1973 Art. 100(a), 54

Keyword:

Novelty - main request (yes)

Decisions cited:

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1120/14 - 3.2.06

D E C I S I O N
of Technical Board of Appeal 3.2.06
of 2 October 2018

Appellant:

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 11 March 2014
rejecting the opposition filed against European
patent No. 1947003 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman	T. Rosenblatt
Members:	M. Hannam
	E. Kossonakou

Summary of Facts and Submissions

I. An appeal was filed by the appellant (opponent) against the decision of the opposition division rejecting the opposition to European patent No. 1 947 003. It requested that the decision be set aside and the patent be revoked.

II. In its letter of response, the respondent (patent proprietor) requested that the appeal be dismissed or that the patent be maintained according to one of auxiliary request 1 or 2.

III. The following documents, referred to by the appellant in its grounds of appeal, are relevant to the present decision:

E9 EP-B-1 289 827,
E16 GB-A-190703414.

IV. The Board issued a summons to oral proceedings with a subsequent communication containing its provisional opinion, in which it *inter alia* questioned the lack of novelty over both E9 and E16.

V. Oral proceedings were held before the Board on 2 October 2018. The final requests of the parties were as follows:

The appellant requested that the decision under appeal be set aside and that the European patent No. 1 947 003 be revoked.

The respondent requested that the appeal be dismissed or that the patent be maintained in amended form according to either of auxiliary requests 1 and 2,

filed with the reply to the statement of grounds of appeal.

VI. Claim 1 of the patent as granted (main request) reads as follows (with feature annotation as used by the parties in their submissions):

	A hub transmission for a bicycle comprising:
M1	a hub axle (10);
M2	a driver (11) rotatably supported by the hub axle (10);
M3	a hub shell (12) rotatably supported by the hub axle (10);
M4	a power transmission mechanism (13) disposed between the driver (11) and the hub shell (12) for communicating rotational power from the driver (11) to the hub shell (12) through a plurality of power transmission paths; and
M5	a shift mechanism (14) for selecting one of the plurality of power transmission paths;
	characterized by
M6	a power transmission auxiliary mechanism (15) disposed between the driver (11) and the hub shell (12) for communicating rotational power from the driver (11) to the hub shell (12)
M7	wherein the power transmission auxiliary mechanism (15) is adapted to function as a bypass
M8	that continues transmitting rotational power from the driver (11) to the hub shell (12) when shifting between two speed stages with the effect that the power transmission

	mechanism (13) can be shifted in an unloaded state.
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Granted claim 19 reads as follows:

M11	A method for shifting a hub transmission of a bicycle wherein one of a plurality of power transmission paths of a power transmission mechanism (13) is selected
	characterized in that
M12	a power transmission auxiliary path is established during shifting by means of a power transmission auxiliary mechanism (15) which functions as a bypass that continues transmitting rotational power from a driver (11) to a hub shell (12) when shifting between two speed stages
M13	such that the power transmission path is selected in a substantially unloaded state of the power transmission mechanism (13).

VII. The appellant's arguments may be summarised as follows:

The subject-matter of claims 1 and 19 was not novel. Claim 1 was very broad and enabled the two speed stages between which unloaded shifting took place to be anticipated by one gear in the power transmission mechanism and the other in the power transmission auxiliary mechanism. When shifting from gear 5 to gear 4 in the patent, the clutch ring 28 disengaging from planet carrier 550 did not occur in an unloaded state such that not the entire shift had to be unloaded. Further, in gear 5, both the power transmission

mechanism and the power transmission auxiliary mechanism were engaged such that either of these could be loaded at the time of shifting; again, the entirety of the claimed shift therefore did not occur in an unloaded state. Claim 1 was of much broader scope than the detailed embodiment since the engagement of the second sun gear 164 did not anyway occur under load, nor was claim 1 limited to shifting just between gears 4 and 5. It thus followed that the direct drive gear via ratchet c in E16 anticipated the claimed power transmission auxiliary mechanism and that the first epicyclic gear train was unloaded up to the point where the sun gear e was locked by the first sun clutch (at least to the same extent as in the patent) when shifting between these two speed stages. Similarly, the direct drive gear of E9 was to be seen as the power transmission auxiliary mechanism which allowed shifting to gear module A in an unloaded state. The arguments presented with respect to claim 1 applied equally to claim 19.

VIII. The respondent's arguments may be summarised as follows:

The subject-matter of claims 1 and 19 was novel. The power transmission auxiliary mechanism was to be seen as an additional, discrete mechanism to the main mechanism for transmitting rotational power. The auxiliary mechanism was further defined to function as a bypass, this clearly being a transmission route circumventing the power transmission mechanism (see paragraph [0011] of the patent). The two speed stages able to be shifted in an unloaded state were thus unambiguously part of the power transmission mechanism. Even if part of the gear 4 to 5 shift in the patent occurred under load, not one part of the shift between

two speed stages in E9 and E16 occurred in an unloaded state; as soon as the pawls or clutch engaged in E9 and E16, load was transmitted. Furthermore, the alleged bypass in E9 (direct drive DD) and E16 (direct drive via ratchet c) had no 'bypass' function since the respective alleged bypasses were considered in the appellant's analysis as also being one of the two gears between which the shift was occurring.

Reasons for the Decision

Main request

1. *Article 100(a) in combination with Article 54 EPC 1973*

The ground for opposition under Article 100(a) EPC 1973 does not prejudice maintenance of the patent as granted.

1.1 Novelty of claim 1 with regard to E16

1.1.1 The Board finds, and there is consensus between the parties, that E16 discloses the following features of claim 1, the references in parentheses referring to E16:

A hub transmission for a bicycle (see Fig. 1) comprising:

- a hub axle (f);
- a driver (b) rotatably supported by the hub axle (f);
- a hub shell (l) rotatably supported by the hub axle (f);
- a power transmission mechanism (sun wheel e, pinion g; sun wheel m, pinion o) disposed between the driver and the hub shell for communicating rotational power

from the driver to the hub shell through a plurality of power transmission paths (page 5, line 53 to page 6, line 8); and

- a shift mechanism (clutch plunger u) for selecting one of the plurality of power transmission paths.

1.1.2 As argued by the appellant, it may also be considered that the following feature is disclosed in E16:

- a power transmission auxiliary mechanism (ratchet c; page 5, lines 49 to 52) disposed between the driver (b) and the hub shell (1) for communicating rotational power from the driver to the hub shell.

1.1.3 With ratchet c seen as corresponding to the claimed power transmission auxiliary mechanism, the Board however finds, contrary to the opinion of the appellant, that the further features of claim 1, specifically M7 and M8 in combination, are not known from E16. In this regard, if the ratchet c of E16 is considered to embody the claimed bypass of feature M7, this 'bypass' fails to operate according to feature M8 i.e. the bypass (ratchet c) fails to continue to transmit rotational power from the driver (b) to the hub shell (1):

- (a) when shifting between two speed stages; and
- (b) with the effect that the power transmission mechanism can be shifted in an unloaded state.

1.1.4 Both the power transmission mechanism and the power transmission auxiliary mechanism are claimed to be disposed between the driver (11) and the hub shell (12; see features M4 and M6). The indication in features M7 and M8 of granted claim 1 that the power transmission auxiliary mechanism functions as a bypass allowing the power transmission mechanism to be shifted in an unloaded state unambiguously identifies that the two

mechanisms are at least functionally separate from each other. This is further corroborated by paragraph [0011] of the patent, with the power transmission auxiliary mechanism being able to transmit rotational power 'circumventing the power transmission mechanism'. It follows therefore that, contrary to the argument of the appellant, the 'two speed stages' of feature M8 must be comprised in the power transmission mechanism, otherwise the claimed bypass could not continue to transmit rotational power from the driver to the hub shell to allow the shifting between the two speed stages with the effect that the power transmission mechanism can be shifted in an unloaded state. If, *arguendo*, the two speed stages were located one in the power transmission mechanism, the other in the power transmission auxiliary mechanism, the claimed bypass would also be one of the two speed stages such that rotational power being transmitted through the bypass would prohibit the unloaded shifting between the two speed stages. In summary therefore, the skilled person would understand that the claimed two speed stages of feature M8 must be comprised in the power transmission mechanism.

- 1.1.5 As found in point 1.1.1 above, the power transmission mechanism of E16 can be considered to be realised through two epicyclic gear trains, the first comprising sun wheel e and pinion g, the second comprising sun wheel m and pinion o. The power transmission auxiliary mechanism of E16 can be considered to be the ratchet c which engages with the wheel hub to provide the direct drive. Features M7 and M8 in combination are thus not known from E16 since, when shifting between the two claimed speed stages (the two epicyclic gear trains of E16), the bypass (direct drive via ratchet c) is inactive and does not transmit rotational power from

the driver (b) to the hub shell (l). Furthermore, the shifting between the two epicyclic gear trains of E16 (sun wheel e and pinion g; sun wheel m and pinion o) does not occur in an unloaded state, either one or the other epicyclic gear train being loaded throughout the shift.

1.2 The appellant argued extensively regarding how the subject-matter of claim 1 should be interpreted and thus how this was anticipated by E16. These arguments were not persuasive as detailed below.

1.2.1 The appellant's argument that, when shifting from gear 5 to 4 in the patent, the clutch ring 28 disengaging from planet carrier 550 did not occur in an unloaded state, meaning that an essential portion of the shift would actually occur under load, does not change the Board's finding regarding E16 failing to anticipate the subject-matter of claim 1. Even if the initial stage of shifting from gear 5 to 4 in the patent (disengaging of the clutch ring from the planet carrier - see table 2, the change from line 7 to line 6) occurs with the clutch ring and planet carrier still under load, the actual shift between gears 5 and 4, i.e. the engaging of the second sun gear 164 (see the change from line 6 to line 5 of table 2), occurs while the power transmission auxiliary mechanism (pawl 18 and ratchet ring 19) is engaged such that this part of the shift from gear 5 to 4 indeed does occur with gears 5 and 4 unloaded as required by feature M8 of claim 1. In comparison, the shift between two speed stages of E16 allegedly anticipating feature M8, whereby according to the appellant's argument one speed stage is comprised in the power transmission mechanism (sun wheel e and pinion g) and the other in the auxiliary mechanism (ratchet c), such shift is at no time unloaded: when

the direct drive via ratchet c is driving, this is loaded; similarly as soon as the drive shifts to the first epicyclic gear train (sun wheel e and pinion g), this also becomes loaded. As a consequence, shifting between two speed stages never occurs in an unloaded state in E16, such that feature M8 cannot be anticipated thereby.

- 1.2.2 The appellant's further argument on this line, that in gear 5 both the power transmission mechanism and the power transmission auxiliary mechanism were engaged such that either of these could be loaded at the time of shifting, this also does not question the power transmission auxiliary mechanism nonetheless functioning as a bypass to enable shifting between two speed stages in an unloaded state, as claimed. At least a portion of the shifting between two gears occurs in an unloaded state in the patent, whereas no such condition is met in E16; either the gear from which shifting is occurring or the gear into which is being shifted is loaded at all times.
- 1.2.3 The argument of the appellant that claim 1 is of much broader scope than the detailed embodiment since the engagement of the second sun gear 164 does not anyway occur under load fails to question the novelty of the subject-matter of claim 1. Irrespective of whether the claimed power transmission auxiliary mechanism functions as a bypass for shifts between speed stages, portions of which are already unloaded, E16 fails to disclose a shift between two speed stages in an unloaded state, such that it cannot deprive the subject-matter of claim 1 of novelty.
- 1.2.4 The appellant's argument that claim 1 covers the power transmission auxiliary mechanism functioning as a

bypass when shifting between any two gear stages, whereas the detailed embodiment only discusses the shift between gears 4 and 5, does not question the finding that the subject-matter of claim 1 is novel over E16. E16 fails to disclose a shift between any two gears at all in an unloaded state.

- 1.2.5 The appellant's further contention that the sun gear e of E16 was unloaded until locked by the first sun clutch is not contradicted, although this does not imply that the two speed stages 'can be shifted in an unloaded state'. In E16, as soon as the sun gear e is engaged by the first sun clutch (see page 5, lines 53 to 55; Fig. 1) drive is transmitted through the first epicyclic gear train to the pinion g (see page 5, lines 29 to 32) i.e. it is loaded. The sun gear e is thus unloaded only until such time that it is shifted into gear whereupon it is immediately under load. It thus follows that at no time is the power transmission mechanism of E16 unloaded during a shift between the direct drive via ratchet c and the sun gear e.
- 1.2.6 Although not argued by the appellant, the same applies also to a shift between the first and second epicyclic gear trains, whereby either one or the other of these two speed stages is loaded at all times during a shift. The combination of features M7 and M8 is thus not known from E16.
- 1.2.7 In summary therefore, the subject-matter of claim 1 is novel over E16, this failing to disclose features M7 and M8 in combination.

1.3 Novelty of claim 1 with regard to E9

1.3.1 The Board finds, and again there is consensus between the parties, that E9 discloses the following features of claim 1, the references in parentheses referring to E9:

A hub transmission for a bicycle (see para [0001] and Fig. 3) comprising:

- a hub axle (1);
- a driver (2, 3) rotatably supported by the hub axle (1);
- a hub shell (26) rotatably supported by the hub axle (1);
- a power transmission mechanism (described from [0035] to [0055]) disposed between the driver (2, 3) and the hub shell (26) for communicating rotational power from the driver to the hub shell through a plurality of power transmission paths (modules A, B, C, transmission via the sun gears 5, 16, 19 and planet pinions 6, 15, 22 depicted above the hub axle in Fig. 3; transmission path for the highest gear, HG, depicted in the upper half of Fig. 4; gears 2 to 8 of the table in [0023]); and
- a shift mechanism (45; page 7, lines 3 to 4) for selecting one of the plurality of power transmission paths.

As argued by the appellant, it may also be considered that the following feature is disclosed in E9:

- a power transmission auxiliary mechanism (transmission route for direct drive, DD, depicted in the lower half of Fig. 4; gear 1 of the table in [0023]) disposed between the driver (2, 3) and the hub shell (26) for communicating rotational power from the

driver to the hub shell.

- 1.3.2 Contrary to the opinion of the appellant, the Board finds that at least features M7 and M8 in combination are not known from E9. With the direct drive DD in the lower half of Fig. 4 being considered the claimed bypass, this does not function according to feature M8 i.e.
- that the bypass continues to transmit rotational power from the drive to the hub shell when shifting between two speed stages;
 - such that the power transmission mechanism can be shifted in an unloaded state.
- 1.3.3 The power transmission mechanism of E9 comprises gear modules A, B and C (see point 1.3.1 above), the power transmission auxiliary mechanism comprising the direct drive DD gear. Features M7 and M8 in combination are thus not known from E9 since, when shifting between the two claimed speed stages (i.e. between two of the three gear modules A, B, C) the bypass (direct drive DD) is inactive and does not transmit rotational power from the driver (2, 3) to the hub shell (26). Furthermore, the shifting between gear modules A, B and C does not occur in an unloaded state, one or other of the modules being loaded at all times throughout the shift.
- 1.3.4 As also accepted by the appellant, its arguments with respect to the alleged lack of novelty over E9 mirror those presented with respect to E16. Having found these to be unpersuasive in regard to questioning the novelty of the subject-matter of claim 1 over E16, the Board finds similarly in regard to the arguments over E9.
- 1.3.5 The subject-matter of claim 1 is thus novel over E9, this failing to disclose at least features M7 and M8 in

combination.

1.4 Novelty of claim 19

Regarding the novelty of the subject-matter of claim 19, the Board sees the same conclusions being valid as those met for claim 1. The parties also relied upon the arguments presented with respect to claim 1. The Board thus finds the subject-matter of claim 19 to be novel over both E9 and E16.

2. Article 100(a) in combination with Article 56 EPC 1973

No objections had been raised in writing by the appellant to the subject-matter of claims 1 and 19 involving an inventive step nor indeed were any raised at the oral proceedings. The Board also saw no *prima facie* reason to question this at any stage of the appeal proceedings.

It follows that this ground of opposition does not form part of the appeal proceedings, so that the Board needs not decide on this issue.

3. In view of the above, the ground for opposition under Article 100(a) in combination with Article 54 EPC 1973 does not prejudice maintenance of the patent as granted.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



B. Atienza Vivancos

T. Rosenblatt

Decision electronically authenticated