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D E C I S I O N
of 20 June 2006

Case Number: T 0284/05 - 3.2.01

Application Number: 97103772.6

Publication Number: 0795461

IPC: B62M 11/16

Language of the proceedings: EN

Title of invention:

A hub bicycle transmission with a coaster brake

Patentee:

SHIMANO INC.

Opponent:

SRAM Deutschland GmbH

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (yes) "

Decisions cited:

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Catchword:

-



Case Number: T 0284/05 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 20 June 2006

Appellant: SRAM Deutschland GmbH
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
27 December 2004 concerning maintenance of
European patent No. 0795461 in amended form.

Composition of the Board:

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

Summary of Facts and Submissions

- I. The appeals by both the patent proprietor and the opponent are directed against the decision posted 27 December 2004 according to which, account being taken of the amendments made by the patent proprietor during the opposition procedure, European patent No. 0 795 461 and the invention to which it relates were found to satisfy the requirements of the EPC.
- II. The following state of the art played a role during the appeal procedure:
- E3: DE-A-28 19 471
- E6: DE-A-25 33 308 (& E7: US-A-4 063 469).
- III. During oral proceedings held 20 June 2006 the patent proprietor initially requested that the patent be maintained as granted (main request) or in the alternative on the basis of first to eleventh auxiliary requests. The opponent requested that the decision under appeal be set aside and the patent revoked.
- At the conclusion of the substantive debate the patent proprietor filed a single request that the decision under appeal be set aside and the patent maintained in amended form on the basis of claims 1 to 11 submitted during the oral proceedings.
- IV. Claim 1 according to the patent proprietor's final request reads as follows:

"A hub transmission with a coaster brake unit comprising:

a hub axle (2);

a drive member (3) rotatably mounted around the hub axle (2);

a hub body (4) rotatably mounted around the hub axle (2);

a planetary gear mechanism (5) coupled between the drive member (3) and the hub body (4) for communicating rotational force from the drive member (3) to the hub body (4) through multiple rotational force transmission paths, the planetary gear mechanism (5) including:

a planet gear (53) supported by a planet gear rack (52) for rotation around the hub axle (2);

a ring gear (54) engaging the planet gear (53); and

a clutch (6) movable in a direction of an axis (X) of the axle (2) between a first position (a) and a second position (c),

characterized in that

the gear rack (52) includes a plurality of depressions (70) formed in a peripheral direction thereof in the form of axial grooves;

the ring gear (54) includes a plurality of serrations (54a) formed in a peripheral direction thereof;

the clutch (6) includes an engagement component (67);

the engagement component (67) projects outwardly in the radial direction;

the engagement component (67) engages with at least one of the plurality of depressions (70) in the gear rack (52) for transmitting forward rotational power to the gear rack (52) when the clutch (6) is located in the first position (a);

the engagement component (67) engages with at least one of the plurality of serrations (54a) in the ring gear (54) for transmitting forward rotational power to the ring gear (54) when the clutch (6) is located in the second position (c); and

forcible movement means (7) for forcibly moving the clutch (6) from the plurality of depressions (70) towards the plurality of serrations (54a) when reverse rotational power is applied to the drive member (3);

the forcible movement means (7) comprises a plurality of inclined surfaces (71,72) wherein each inclined surface (71,72) includes a first inclined surface (71) and a second inclined surface (72) located adjacent to the first inclined surface (71), the second inclined surface (72) has a greater inclination than the first inclined surface (71), and further comprises a third, flat surface (76) adjacent to each second inclined surface (72), wherein the first and second inclined surface (71,72) and the third, flat surface are formed in the gear rack (52) for contacting the engagement

component (67) and pushing the clutch (6) from the depression (70) towards the serration (54a) when reverse rotational power is applied to the drive member (3), and

wherein a distance (D1) of the second inclined surface (72) and the third, flat surface (76) of each depression (70) in the peripheral direction is greater than a pitch (D2) in the peripheral direction of the plurality of serrations (54a)."

Claim 1 is followed by claims 2 to 11 which define features additional to those of claim 1.

V. The arguments of the patent proprietor may be summarised as follows:

Claim 1 is essentially a combination of original claims 15, 18 and 23 and of granted claims 15 and 23 respectively.

The subject-matter of claim 1 includes the feature of first and second inclined surfaces having different inclinations. The first surface moves the engagement component from the depressions before engagement with the serrations begins. The less steep inclination of this surface results in a faster operation of the brake in response to a reverse rotation of the drive member. Moreover, the relationship between the lengths D1 and D2 ensures that after the clutch leaves a depression the engagement component will always enter a serration. Neither of these features is disclosed in the cited prior art.

VI. The opponent advanced no objections in respect of the patent proprietor's final request.

Reasons for the Decision

1. The board is in agreement with both parties that claim 1 satisfies the requirements of Articles 123 and 84 EPC. In particular, claim 1 now specifies that the distance D1 relates only to the second and third surfaces in respect of which the relationship $D1 > D2$ was originally disclosed. Moreover, the board is satisfied that both the dependent claims and the description and drawings as presented during the oral proceedings are consistent with claim 1.

2. The patent relates to a multi-speed hub transmission having a back-pedal ("coaster") brake. When the drive member is rotated forwards it applies the forward drive torque to the transmission and this torque may be multiplied or reduced through the transmission according to the selected gear ratio. Similarly, when the drive member is rotated backwards by "back-peddalling" it applies the reverse torque to the transmission. Selection of a gear ratio involves the operation of a clutch having two operative positions. In a first one of those positions the clutch connects the drive member to the ring gear by virtue of an engagement component on the clutch entering into a serration on the ring gear. The transmission is arranged so that the reverse torque for operating the brake is applied always through the same path in the transmission irrespective of the selected gear ratio. In this "braking path" the drive member is connected to

the ring gear by the clutch in the described first position. If braking is desired when the clutch is in the other position a combination of inclined and flat surfaces when subjected to the reverse rotation act as cams to bring the clutch into the first position. In this way unpredictable braking performance resulting from the transmission multiplying or reducing the braking torque in dependence on the selected ratio is prevented.

3. The closest state of the art is that disclosed by E3 and which is a multi-speed hub transmission as described above. The inclined surfaces are shown in the drawings as being each of a single inclination and are not further described. No relationship is defined between the length of the inclined and flat surfaces in the peripheral direction and the pitch of the serrations in the ring gear.
 - 3.1 The features of the less steeply inclined first surface and the relationship $D1 > D2$ specified in present claim 1 have the respective effects of bringing the engagement component into proximity with the serrations more quickly and ensuring that the engagement component enters a serration as soon as they are in phase. These features therefore solve the problem of ensuring a reliably rapid application of the brake in response to reverse rotation of the drive member.
 - 3.2 E6/E7 also discloses a multi-speed hub transmission having a back-pedal brake. As with the transmissions of the present patent and E3 the clutch may occupy two engaged positions, in one of which it engages serrations in the ring gear. E6/E7 employs cams to

prevent the clutch member being in a position between its two end positions in which it is engaged for one gear ratio before it has disengaged from the other. However, the problem solved by the subject-matter of present claim 1, of rapidly and reliably engaging the one end position for braking, is not addressed. The cam faces according to E6/E7 exhibit a single angle of inclination and, even if it may be deduced from studying the drawings that the relationship $D1 > D2$ is present, there is no express teaching to this effect.

- 3.3 It follows from the foregoing that the subject-matter of claim 1 is not rendered obvious by the cited state of the art. Since claims 2 to 11 contain all features of claim 1 the same conclusion applies also to these claims.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of the following documents:
 - claims 1 to 11
 - description pages 2, 2a, 3 to 6

- drawings figures 1 to 19

all submitted at the oral proceedings.

The Registrar:

The Chairman:

A. Vottner

S. Crane