Appeal decision

Appeal No. 2015-10436

Germany
Appellant ZF FRIEDRICHSHAFEN AG

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The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2012-535741, entitled "Drivetrain of a vehicle" (international publication on May 5, 2011, International Publication No. WO2011-051138; national publication of the translated version on March 7, 2013, National Publication of International Patent Application No. 2013-508221) has resulted in the following appeal decision:

Conclusion

The appeal of the case was groundless.

Reason

No. 1 History of the procedures

The application was originally filed on October 19, 2010 (priority claim under the Paris Convention, received by the foreign receiving office, October 26, 2009, Federal Republic of Germany) as an international filing date; the national form paper was submitted on April 25, 2012; translation of the description, the scope of claims, abstract, and the drawings were submitted on June 22, 2012; a written amendment was submitted on June 29, 2012; reasons for refusal were notified on June 12, 2013; a written opinion and written amendment were submitted on September 13, 2013; a final notification of reasons for refusal was made on March 7, 2014; and although a written opinion and written amendment were submitted on June 10, 2014, an examiner's decision of refusal was issued on January 29, 2015. Against this, an appeal against the examiner's decision of refusal was requested on June 3, 2015 and a written amendment was submitted at the same time; the reasons for refusal by the body were notified on December 9, 2015; and a written opinion and written amendment were submitted on March 7, 2016.

No. 2 The Invention

The invention relating to Claims 1 to 4 of the present application is specified by matters described in Claims 1 to 4 of the scope of claims as viewed from the description which has been amended by the written amendment submitted on June 10, 2014, the scope of claims which has been amended by the written amendment submitted on March 7, 2016, and the translation of drawings submitted on June 22, 2012; wherein the invention (hereinafter referred to as "the Invention") relating to Claim 1 is as follows:

"[Claim 1]

In a drive-train of a vehicle having an internal combustion engine (1) and a continuously variable transmission (4) for driving under internal combustion engine power and having at least one electric machine (6) for driving under electric power:

the electric machine (6) can be coupled on a driven side in such a manner that electric driving is enabled in a manner decoupled from the continuously variable transmission (4) and a component of an internal combustion engine drive system;

the drive-train additionally comprises at least one two-stage transmission (7) at the driven side;

an input gear of the two-stage transmission (7) and an output gear of the two-stage transmission (7) are associated with the electric machine (6) and an axle differential (8), respectively;

the component of the internal combustion engine drive system is driven by the continuously variable transmission (4) in driving under internal combustion engine power, and does not need to be driven for electric driving by the electric machine (6) in electric driving;

the electric machine (6) can be decoupled from an output shaft (5) of the continuously variable transmission (4) by means of at least one shifting element (9, 10);

the shifting element (9, 10) has a shifting claw;

and the output shaft (5) of the continuously variable transmission (4) and the output shaft of the electric machine (6) are coaxially arranged."

No. 3 Publication

1. Publication

(1) Described matters in Cited Publications

Japanese Unexamined Patent Application Publication No. 2001-78307 (hereinafter, referred to as "the Publication") which was distributed before the priority date of the application and cited in the reasons for refusal by the body includes the following description with drawings:

1 a) "[0019]

[Mode for carrying out the invention] A structure of a hybrid car according to one embodiment of the present invention is described with reference to FIG. 1. FIG. 1 shows a power transmission system of the hybrid car and a control system for controlling the power transmission system.

[0020] First, the structure of the power transmission system is described. An output shaft of the engine E is connected to an oil pump 2 through a sub-motor 1. The sub-motor 1 starts or assists the engine E. The oil pump 2 generates oil pressure by the driving force of the engine E for controlling the transmission of a CVT 4 through an oil pressure control device 24.

[0021] Furthermore, the output shaft of the engine E is connected to a planetary gear 3 for switching between forward and reverse driving of the car. This planetary gear 3 is connected mechanically to a select bar not shown in the figure, and switching between forward and reverse driving of the car can be carried out by an operation of the select bar.

[0022] The output shaft of the planetary gear 3 is connected to a driving side pulley 5

included in the CVT 4 for operating the variable transmission. The CVT 4 includes a metal belt 6, a driven side pulley 7, and side chambers 8 and 9, in addition to the driving side pulley 5. On the driving side pulley 5 and the driven side pulley 7, a common metal belt 6 is wound around both pulleys so that power can be transmitted between the pulleys.
[0023] On the respective sides of the driving side pulley 5 and driven side pulley 7, side chambers 8 and 9 are provided for changing the respective winding radii of the metal belt 6 around both pulleys. The winding radii vary according to the movement of inclined surface contacts between the belt and pulleys which is caused due to the change of the widths of the pulleys according to the oil pressure applied to the side chambers 8 and 9. The oil pressure applied to the side chambers 8 and 9 is generated by the oil pump 2.
[0024] The driven side pulley 7 included in the CVT 4 is connected to an engaging element 11 included in a clutch 10. The clutch 10 includes, in addition to the engaging element 11, an engaging element 12 forming a pair with the engaging element 11, and a clutch controlling actuator 13 which connects or separates these engaging elements 11 and 12.
[0025] The engaging element 12 included in the clutch 10 is connected to a final reduction gear 14 and a gear 15. The final reduction gear 14 is engaged with a differential gear 16. The differential gear 16 is connected to a driving wheel W of the car through an axle shaft 17.
[0026] The above described gear 15 is engaged with a gear 18, which is connected to a rotation axis of a main motor 19." (Paragraphs [0019] to [0026])

1b) "[0038] When the car travels by the driving force of the main motor 19; that is, when the car is in a motor drive mode, the clutch 10 is in the off state. That is, the engaging elements 11 and 12 included in the clutch 10 are separated and the rotation is not transmitted across the engaging elements. Thus, the transmission of the rotation of the final reduction gear 14 is disconnected at the clutch 10 and the rotation is not transmitted to the CVT4.
[0039] Therefore, the rotation of the final reduction gear 14 is transmitted only to the differential gear 16, and the transmitted rotation is transmitted to the driving wheel W through the axle shaft 17. According to the above described operation, the driving wheel W is driven by the main motor 19 and the car travels." (Paragraphs [0038] to [0039])

(2) The following matters are seen from the descriptions in the above (1) and FIG. 1:

2a) It can be perceived from FIG. 1 that the power transmission system of the hybrid car comprises a gear group consisting of the gear 15, the gear 18, and the final reduction gear 14, and the input side of the gear group is the main motor 19 and the output side of the gear group is the differential gear 16.

2b) From the descriptions in the above (1) 1b) and FIG. 1, it can be seen that the output shaft of the CVT 4 is a component which is driven by the CVT 4 when traveling by the driving force of the engine E and which does not need to be driven for motor driving by the main motor 19 when in a motor drive mode.

(3) Cited Invention

Summing up all the descriptions in the above (1) and (2), and FIG. 1, the Publication includes the following invention (hereinafter, referred to as "the Cited Invention"):

"In a power transmission system of a hybrid car having an engine E and a CVT 4 for driving by the driving force of the engine E and having at least one main motor 19 for driving in a motor drive mode:

the main motor 19 can transmit its rotation to a driving wheel W side so as to enable motor driving in a state where rotation is not transmitted from the CVT 4 and the output shaft of the CVT 4;

the power transmission system of the hybrid car comprises a gear group consisting of gears 15 and 18 and a final reduction gear 14;

an input side of the gear group and an output side of the gear group are connected to the main motor 19 and a differential gear 16, respectively;

the output shaft of the CVT 4 is a component which is driven by the CVT 4 when travelling by the driving force of the engine E and which does not need to be driven for motor driving by the main motor 19 when travelling in a motor drive mode;

and the main motor 19 can be in a state where the rotation is not transmitted from the output shaft of the CVT 4 by means of a clutch 10."

No. 4 Comparison / Judgment

The Invention and Cited Invention are compared.

The "engine E" of the Cited Invention corresponds to the "internal combustion engine" of the Invention in terms of the function, structure, or technical significance thereof; and similarly, the "CVT 4" to "continuously variable transmission," "driving by the driving force of the engine E" to "driving under internal combustion engine power," the "main motor 19" to the "electric machine," "motor driving" to "electric driving," the "power transmission system of the hybrid car" to the "drive-train of a vehicle" or "drive-train," the "output shaft of the CVT 4" to the "component of the internal combustion engine drive system," "in a state where the rotation is not transmitted" to "decoupled," the "driving wheel W side" to the "driven side," "can transmit its rotation" to "can be coupled," and "comprises" to "additionally comprises," respectively.

Also, "a gear group consisting of gears 15 and 18 and a final reduction gear 14" in the Cited Invention is one that is formed by joining two pairs of gears in view of FIG. 1 and so on; and therefore, it corresponds to the "two-stage transmission" in the Invention.

In addition, the "input side of the gear group" corresponds to the "input gear of the two-stage transmission" in terms of the function, structure, or technical significance thereof; and similarly, the "output side of the gear group" to the "output gear of the two-stage transmission," the "differential gear 16" to the "axle differential," "connected ... respectively" to "associated ... respectively," and "can be in a state where the rotation is not transmitted" to "can be decoupled."

Furthermore, the "clutch 10" in the Cited Invention and the "shifting element" that "has a shifting claw" in the Invention are in correspondence to the extent that they are "driving force connecting/disconnecting means."

Thus, the corresponding features and different features between them are as follows:

[Corresponding features]

"In a drive-train of a vehicle having an internal combustion engine and a continuously variable transmission for driving under internal combustion engine power and having at least one electric machine for driving under electric power:

the electric machine can be coupled on a driven side in such a manner that electric driving is enabled in a manner decoupled from the continuously variable transmission and a component of the internal combustion engine drive system;

the drive-train additionally comprises at least one two-stage transmission at the driven side;

an input gear of the two-stage transmission and an output gear of the two-stage transmission are associated with the electric machine and an axle differential, respectively;

the component of the internal combustion engine drive system is driven by the continuously variable transmission in driving under internal combustion engine power, and does not need to be driven for electric driving by the electric machine in electric driving;

and the electric machine can be decoupled from an output shaft of the continuously variable transmission by means of at least one driving force connecting/disconnecting means."

[Different Feature 1]

As for the driving force connecting/disconnecting means, in the Invention, it is a "shifting element" which has a shifting claw; whereas in the Cited Invention, it is a "clutch 10" for which it is unclear that the clutch has a shifting claw.

[Different Feature 2]

In the Invention, the output shaft (5) of the continuously variable transmission (4) and the output shaft of the electric machine (6) are coaxially arranged; whereas in the Cited Invention, it is unclear that the output shaft of the CVT 4 and the output shaft of the main motor 19 are coaxially arranged.

The above different features are examined.

[Regarding Different Feature 1]

When considered by combining both the description of "... can be connected by means of a shifting element 9, for example a shifting claw ..." in paragraph [0019] of the specification of the Invention and the shape of the shifting element shown in FIG. 1 of the present application, the "shifting element" in the Invention is recognized to be driving force connecting/disconnecting means that has a shifting claw which extends in a contacting/separating direction of the shifting element and connects/disconnects to/from the driving force by contacting/separating the shifting claw.

The driving force connecting/disconnecting means such as a jaw clutch that has a shifting claw and connects/disconnects the driving force by contacting/separating the

shifting claw is well-known without giving an example; and the " clutch 10" in the Cited Invention has a common function of contacting/disconnecting the driving force. Therefore, a person skilled in the art could easily derive the matter specifying the Invention pertaining to the aforementioned Different Feature 1 by adopting, instead of the "clutch 10" of the Cited Invention, well-known driving force connecting/disconnecting means such as a jaw clutch that has a shifting claw and connects/disconnects the driving force by contacting/separating the shifting claw.

[Regarding Different Feature 2]

It is not remarkable to arrange the output shaft of the CVT 4 coaxially with the output shaft of the main motor 19 in the Cited Invention, as observed, for example, in International Publication No. WO 2005-108143 (refer to FIG. 1, etc.), and it is recognized as a design issue that can be appropriately achieved by a person skilled in the art under a general problem such as miniaturization.

In addition, in view of the Invention as a whole, it cannot be recognized that more remarkable effects than expected from the Cited Invention are exhibited.

No. 5 Closing

Hence, the Invention could be easily made by a person skilled in the art from the Cited Invention and thus, the appellant should not be granted a patent for the Invention in accordance with the provisions of Article 29(2) of the Patent Act; and therefore, the present application should be rejected.

Thus, the appeal decision shall be made as described in the conclusion.

April 25, 2016

Chief administrative judge: NAKAMURA, Tatsuyuki
Administrative judge: MATSUSHITA, Akira
Administrative judge: KANAZAWA, Toshio