

Hybrid vehicle and driving motor system thereof

Abstract

A driving motor system and a hybrid vehicle comprising same. The driving motor system comprises a housing (11), at least two sub motors (12) arranged in the housing (11), a planet wheel (13) arranged on the output shaft of each said sub motor (12), a sun wheel (14) engaged with each planet wheel (13), and a total output shaft (15) coaxially connected to the sun wheel (14). The driving motor system has small volume and high power, and can be used for large vehicle.

Classifications

 **F16H1/22** Toothed gearings for conveying rotary motion without gears having orbital motion involving more than two intermeshing members with a plurality of driving or driven shafts; with arrangements for dividing torque between two or more intermediate shafts

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Inventor: [姚友良](#), [宋润州](#), [侯文军](#), [石松山](#)

Worldwide applications

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Claims

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1. A drive motor system, characterized in that it includes a box body, at least two sub-motors arranged on the box body, planetary gears arranged on the output shafts of each of the sub-motors, and meshing with each of the planetary gears. The sun gear and the total output shaft are coaxially connected with the sun gear.
2. The drive motor system according to claim 1, wherein the box is provided with a rotation shaft bearing position passing through the planet wheel, a meshing position of the planet wheel and the sun gear, and a position of the sun gear. A first coolant circulation channel at the position of the rotating shaft bearing. The drive motor system also includes a liquid storage device communicated with the first coolant circulation channel, and a first circulation that drives the coolant to flow along the first coolant circulation channel. A power device and a heat dissipation device for dissipating heat in the liquid storage device.
3. The drive motor system according to claim 2, wherein the box is further provided with a second coolant circulation channel passing through each sub-motor, and the second coolant circulation channel and the liquid storage device are in communication, the drive motor system further includes a second circulation power device for driving the coolant to flow along the second coolant circulation channel.
4. The drive motor system according to claim 1, wherein the box body includes a front end cover and a rear end cover, and the total output shaft is connected to the front end cover through a bearing.
5. The drive motor system according to claim 1, further comprising a torque sensor for detecting the output shaft torque of each of the sub-motors and controlling each of the sub-motors according to the torque detected by the torque sensor. Torque controller.
6. The drive motor system of claim 5, further comprising a display for displaying the torque detected by the torque sensor.
7. The drive motor system according to claim 1, characterized in that each of the sub-motors is a permanent magnet motor.
8. A hybrid vehicle, characterized in that it includes a drive motor system as described in any one of claims 1-7.

Description

Hybrid vehicle and its driving motor system

The present invention relates to the field of motor technology, and more particularly to a hybrid vehicle and a drive motor system thereof.

Background technique

As China's oil resources become increasingly tight, the importance of energy conservation has risen to the level of national energy security. In addition, large vehicles with commercial diesel as the main driving material have become one of the important factors for environmental pollution and excessive energy consumption.

Starting from solving environmental protection needs and energy crisis issues, the development of electric drive technology has received wide attention worldwide. At present, the electric drive technology that can be applied to various types of vehicles mainly includes pure electric technology and hybrid power technology. Compared with the two technologies, hybrid technology has an absolute advantage in terms of technology, performance and cost.

The drive motor and its control system are the key to the hybrid technology. Generally, the drive motor on the hybrid vehicle should meet the following requirements, such as high efficiency, low loss, light weight, small size, high power density, and strong overload capability. , low cost, good reliability, etc.

There are many types of drive motors. The following is a comparison of the performance of different drive motors.

On Off Item DC Motor Induction Motor 7j Magneto

Reluctance motor, low specific power, medium, high, peak efficiency

85-89 94-95 95-97 90 rate (%)

Load efficiency

80-87 90-92 85-97 78-86 rate (%)

Power factor

- 82-85 90-93 60-65 number (%)

Constant power

- 1 : 5 1 : 2.25 1 : 3 area Speed range

4000-6000 12000-15000 4000-10000

Surrounding (r/min) > 15000 Reliability Generally Good Excellent Good Structure

Poor good general good firmness

Motor

Large, medium and small

Motor quality

Big, medium and small

Motor into

10 8~12 10-15 6~10 this (\$/kW)

Control operation

Best, good, good performance.

Controller

Low ask general cost

Compared with other types of motors, permanent magnet synchronous motors have the following advantages: high efficiency, high power factor, high power density; simple structure, good reliability, small size, light weight, easy maintenance; low overall heat generation, cooling system Simple; motor dynamic performance, limit speed and braking performance are superior to other types of motors.

Despite the high power density of permanent magnet synchronous motors, due to technical limitations, ultra-high-power permanent magnet motors are expensive, bulky, and difficult to apply to actual production. At present, permanent magnet synchronous motors in hybrid vehicles are only used in small family cars. There is little interest in large vehicles with high fuel consumption and high pollution.

Therefore, how to provide a drive motor suitable for a large vehicle has become an important technical problem to be solved by those skilled in the art. Summary of the invention

The present invention provides a drive motor system that is small in size and high in power and can be applied to a large vehicle. The present invention also provides a hybrid vehicle including the above-described drive motor system.

A drive motor system provided by the present invention includes a case and at least one of the cabinets Two sub-motors, a planet gear disposed on each of the sub-motor output shafts, a sun gear meshing with each of the planet wheels, and a total output shaft coaxially coupled to the sun gear.

Preferably, the casing is provided with a first coolant circulation passage passing through a position of a rotating shaft bearing of the planetary gear, a position of the planetary gear and the sun gear meshing position, and a position of a rotating shaft bearing of the sun gear, the driving The motor system further includes a liquid storage device in communication with the first coolant circulation passage, a first circulation power device that drives the coolant to flow along the first coolant circulation passage, and a heat for dissipating heat in the liquid storage device Heat sink.

Preferably, the tank is further provided with a second coolant circulation passage through each sub-motor, the second coolant circulation passage is in communication with the liquid storage device, and the drive motor system further comprises driving cooling a second circulating power unit in which the liquid flows along the second coolant circulation path.

Preferably, the case includes a front end cover and a rear end cover, and the total output shaft is coupled to the front end cover by a bearing.

Preferably, a torque sensor for detecting an output shaft torque of each of the sub-motors and a controller for controlling each of the sub-motor torques according to the torque detected by the torque sensor are further included.

Preferably, a display for displaying the torque detected by the torque sensor is also included. Preferably, each of the sub-motors is a permanent magnet motor.

The present invention also provides a hybrid vehicle comprising the drive motor system of any of the above.

The invention provides a driving motor system, comprising a box body, at least two sub-motors disposed on the box body, planet wheels disposed on an output shaft of each of the sub-motors, and a sun meshing with each of the planet wheels a wheel and a total output shaft coaxially coupled to the sun gear. In this way, the driving

motor system provided by the present invention integrates a plurality of sub-motors together through a box, and has a small volume. In addition, the output shaft of each sub-motor transmits power to the planetary gears, and each of the planetary gears is coupled with the sun gear. Engagement, the sun gear is simultaneously driven by a plurality of planetary gears, and the drive motor system provided by the present invention is large in power and small in size, and can be applied to a large vehicle.

The present invention also provides a hybrid vehicle including the drive motor system as described above. In this way, the hybrid vehicle provided by the present invention has a large power and small volume, and the derivation process of the beneficial effect is substantially similar to the derivation process of the beneficial effects of the above-mentioned driving motor, and thus will not be described herein. DRAWINGS

1 is a schematic diagram of an exploded structure of a drive motor system according to an embodiment of the present invention; FIG. 2 is a power transmission route diagram of a drive motor system according to an embodiment of the present invention; FIG. 3 is a first cooling of a drive motor system according to an embodiment of the present invention; FIG. 4 is a schematic diagram of a second cooling system of a driving motor system according to an embodiment of the present invention; FIG. 5 is a schematic diagram of a monitoring system of a driving motor system according to an embodiment of the present invention. detailed description

The present embodiment provides a drive motor system that is small in size and high in power and can be applied to a large vehicle. This embodiment also provides a hybrid vehicle including the above-described drive motor system.

The technical solutions in the embodiments of the present invention are clearly and completely described in the following with reference to the accompanying drawings in the embodiments of the present invention. It is obvious that the described embodiments are only a part of the embodiments of the present invention, but not all of the embodiments. All other embodiments obtained by a person of ordinary skill in the art based on the embodiments of the present invention without creative efforts are within the scope of the present invention.

Referring to FIG. 1 to FIG. 5 , the driving motor system provided by the present embodiment includes a casing 11 , at least two sub-motors 12 disposed on the casing 11 , and planet wheels 13 disposed on the output shaft of each sub-motor 12 , and The sun gear 14 in which the respective planet gears 13 are meshed and the total output shaft 15 coaxially connected to the sun gear 14.

In this way, the driving motor system provided by the present embodiment integrates the plurality of sub-motors 12 through the casing 11 and has a small volume. In addition, the output shaft of each sub-motor 12 transmits power to the planetary gears 13 and the respective planets. The wheels 13 are meshed with the sun gear 14, and the sun gear 14 is simultaneously driven by a plurality of planet wheels 13. The drive motor system provided by the present invention has a large power and a small size, and can be applied to a large vehicle.

Preferably, in the specific embodiment, a first cooling system is disposed in the casing 11, and the first A cooling system includes a position of a shaft bearing passing through the planetary gear 13, that is, a position of the planetary wheel shaft bearing 16 shown in FIG. 3, a meshing position of the planetary gear 13 and the sun gear 14, that is, a position of the gear train gear pair 17 shown in FIG. And the first cooling liquid circulation path of the sun shaft bearing position of the sun gear 14, that is, the position of the sun gear output shaft bearing 18 shown in FIG. 3, the driving motor system further includes a liquid storage device 19 communicating with the first coolant circulating circuit, and driving A first circulating power unit 20 through which the coolant flows along the first coolant circulation path and a heat sink for dissipating heat in the liquid storage unit 19.

The heat sink of the liquid storage device 19 may be a fan. The air flow provided by the fan brings in the heat in the liquid storage device 19 to reduce the temperature of the coolant. The first circulating power device 20 may be a pump.

With this arrangement, the drive motor system provided by the present embodiment can effectively cool the position of the planetary wheel shaft bearing 16 , the position of the gear train gear pair 17 and the position of the sun gear output shaft bearing 18 to prevent high temperature during operation and to the components. Life expectancy has an adverse effect.

In addition, the specific embodiment may further include a second cooling system including a second coolant circulation passage disposed in the casing 11 and passing through each of the sub-motors 12, a second coolant circulation passage and a liquid storage device. The 19-phase communication, the drive motor system further includes a second circulating power unit 21 for driving the coolant to flow along the second coolant circulation path.

It should be noted that the second cooling system may share a liquid storage device 19 and a heat sink with the first cooling system, and the second circulating power device 21 may also be a pump.

With this arrangement, the drive motor system provided by the present embodiment can cool the stator, the rotor, and the like of each of the sub-motors 12 to prevent the sub-motor 12 from being generated at a high temperature during operation and adversely affecting the life of the components.

As a preferred and exemplified, the casing 11 of the drive motor system includes a front end cover 22 and a rear end cover 23, and the total output shaft 15 is coupled to the front end cover 22 by bearings. With this arrangement, the drive motor system can be easily disassembled, thereby improving the operability of the inspection drive motor system.

In a preferred embodiment of the present embodiment, a torque sensor 24 for detecting the output shaft torque of each of the sub-motors 12 and a controller 25 for controlling the torque of each of the sub-motors 12 based on the torque detected by the torque sensor 24 are further included. The controller 25 can control the output torque of each of the sub-motors 12 by controlling the input current of each of the sub-motors 12. Additionally, the drive motor system provided by this embodiment may further include a display for displaying the torque detected by the torque sensor 24. 26. With this arrangement, the torque of each sub-motor 12 can be monitored by the display 26 and the controller 25, ensuring that each sub-motor 12 system can operate accurately.

In the embodiment, each of the sub-motors 12 is preferably a permanent magnet motor, and may of course be a DC motor, an induction motor or a switched reluctance motor.

This embodiment also provides a hybrid vehicle including the drive motor system as described above. In this way, the hybrid vehicle provided by the embodiment has a large power and a small volume, and the derivation process of the beneficial effect is substantially similar to the derivation process of the beneficial effects of the above-mentioned driving motor, so the description will not be repeated herein. .

The above description of the disclosed embodiments enables those skilled in the art to make or use the invention. Various modifications to these embodiments are obvious to those skilled in the art, and the general principles defined herein may be implemented in other embodiments without departing from the spirit or scope of the invention. Therefore, the present invention is not intended to be limited to the embodiments shown herein, but the broadest scopes

Patent Citations (6)

Publication number	Priority date	Publication date	Assignee	Title
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Family To Family Citations				

* Cited by examiner, † Cited by third party

Similar Documents

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Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
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PCT/CN2013/082356	2013-08-27	2013-08-27	Hybrid vehicle and driving motor system thereof
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Applications Claiming Priority (1)

Application	Filing date	Title
PCT/CN2013/082356	2013-08-27	Hybrid vehicle and driving motor system thereof

Legal Events

Date	Code	Title	Description
2015-04-15	121	Ep: the epo has been informed by wipo that ep was designated in this application	Ref document number: 13892671 Country of ref document: EP Kind code of ref document: A1
2016-02-29	NENP	Non-entry into the national phase	Ref country code: DE
2016-09-21	122	Ep: pct application non-entry in european phase	Ref document number: 13892671 Country of ref document: EP Kind code of ref document: A1

Concepts

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■ liquid	claims,description	13	0.000		
■ communication	claims,description	4	0.000		
■ heat dissipation	claims	1	0.000		
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