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Research on Energy Recovery System

Longfei Chen, Hongxu Sun, Yang Chen, Zuyue Liu, and Jinjin Wu

Anhui Institute of Information Technology, Anhui 241199, China

Abstract

At the 19th National Congress of the Communist Party of China, a series of policies related to energy conservation and emission reduction and environmental protection were proposed. General Secretary Xi Jinping announced in the general debate of the 75th UN General Assembly that China strives to reach the peak of carbon dioxide emissions by 2030 and strive to achieve carbon neutrality before 2060. At present, my country lacks the necessary high -tech as a actual effect to support environmental protection. my country's motor vehicle ownership has increased steadily year by year. Nowadays, the recycling of automobile braking energy is concentrated when using the inertia of the car during the brake, but the thermal energy generated during friction does not get good recycling, and the energy recovery system of most car brake systems is not highly available, generally generally, generally There is a phenomenon of insufficient low -speed torque force, which cannot brake quickly in time, and even cause the brake pads to kill, causing a security accident. The automotive manufacturing industry must carry out its own transformation, upgrade or introduce new technologies from the traditional manufacturing process to promote energy conservation and emission reduction. The popularization of carbon emissions trading system is an important measure for China to fulfill the "3060" dual carbon commitment. So far, the energy storage of flywheel, hydraulic energy storage, and electrochemical energy storage. We visited Anhui, and after the relevant government departments and the automotive industry in Zhejiang, we designed a brake system based on energy recovery. This system replaced the car's brake pliers to the ring brake box and put the hydrofluor ether substance in the ring brake box. (The hydrofluor ether is used to absorb heat and converts it into other forms of energy). Based on the recycling and using the system of brake pads and brake disc friction during the recycling and use of the car brake disc Can help the box and temperature difference electrical electrical electrical, thereby realizing the recycling and utilization of automotive braking thermal energy. The heat energy during braking gasification of hydrofluor ether, hydrofluor ether gas push the fan blade rotation to drive the generator to generate electricity and rotate the flywheel to form a heavy weight to form a heavy weight to form a heavy weight to form a heavy weight to form a weight Energy recycling, temperature difference electrical electricity uses the temperature difference of the brakes, and the Elberg effect generates electrical energy stored in the battery to form dual energy recycling; under the operating conditions of more frequent braking and starting urban operating conditions, it can effectively recycle brakes. Energy can extend the driving distance of electric vehicles by 10 % -30 %. Therefore, the research and application of energy conservation and emission reduction technologies for automotive engines is particularly important to alleviate the current situation. This system has the characteristics of wide applicability, fuel -saving power saving, and reducing emissions. It is suitable for large -scale promotion and use to meet the needs of low -carbon energy conservation and environmental protection.

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Keywords

Bashing Energy Recycling; Dual Recovery; Hydrofluor Ether Substance; Energy Conservation and Environmental Protection.

1. Introduction

In general cars, when the vehicle slows down and brakes, the heat generated by the friction of the brake pads and brake discs will be lost in the air, but the thermal energy generated during friction does not get good recycling. The system we designed is mainly energy recovery modules. During the car brake, the brake pads are first in contact with the brake disc, while the shock absorption spring is compressed. During the spring reset process, the ring brake box is promoted to friction with the brake pads to ensure the safety of the brake. During the brakes, the thermal energy generated by the ring brake box gas is gasified by the hydrofluor ether material, and the fan blades in the fan wheels are rotated through the air conductor and gas. The generator is surrounded by the ring brake box. The temperature difference of the brakes is used to generate electrical energy and stored in the battery to form dual energy recovery. This system enables the heat generated during the brakes to be reasonably collected, forming some energy recycling, thereby achieving the purpose of recycling energy, energy saving and emission reduction. The overall schematic diagram of the system of this system is shown in Figure 1, and the overall three -dimensional renderings are shown in Figure 2.

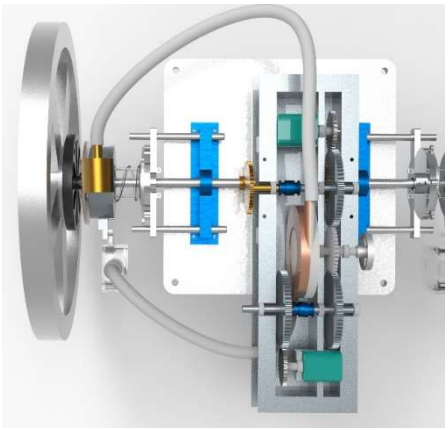

Figure 1. The overall principle diagram of the brake system based on energy recovery

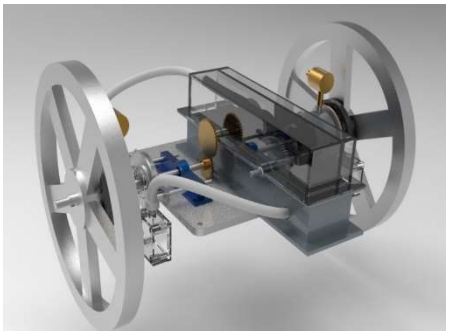

Figure 2. Overall rendering based on energy recovery system

2. Design Scheme

2.1 Energy Recycling Module

The energy recycling module includes a ring brake box and hydrofluor ether substance, temperature difference electrical, fan wheel, flywheel, battery, catheter, condenser and generator. When the car

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brakes, the driver steps on the brake pedal, and the first clutch promotes the contact with the brake disc and friction. The friction of the ring brake box and the brake pads generates thermal energy. As the temperature is not continuously increased, the hydrofluor ether material in the ring brake box is converted into a auto -state, and the energy changes from "thermal energy" to "wind energy"; vaporized hydrofluent ether; The material will absorb a large amount of heat to reduce the temperature of the brake pads and improve the durability of the brake pads. When the pressure in the box reaches a certain value, the order valve is turned on, and the airflow follows the pipe of the pipe to enter the fan wheel. The gaseous hydrofluor ether material pushs the fan blades in the fan wheel. The wheels drive the generator to power the generator through the gears at all levels, and the energy changes from "mechanical energy" to "electrical energy" to form a heavy energy recovery; the temperature difference electrical electrical appliances surround the circular brake box, using the temperature difference of the brakes, and the Syberg effect will be converted into the heat energy to into Electric energy is stored in the battery to form dual energy recovery. The gases in the fan wheel will enter the condenser to become a hydrofluor ether substance and enter the ring brake box to prepare for the next friction brakes. The work has great energy conservation and emission reduction benefits. (It should be noted that the internal pressure of the entire device needs to be high -pressure state, ensuring that the gesture after condensation can be converted into liquid state).

2.2 Theoretical Design Calculation

2.2.1 Storage of Brake Brake Energy

The brake system based on energy recovery is recycled and utilized the energy of the car braking. The following description is made according to the energy storage of the car's brakes:

(1) Car braking to stopping and starting the car in a short period of time. This system first converts the energy of its brakes into heat and stores in the hydrofluoroham substance, and then stored in the flywheel through the conversion of the fan wheel. A small number of energy in the flywheel is converted into electrical energy and stored in the battery through the generator. The speed of setting the start of car brake is, then.

The calories stored in the car brakes are:

$$Q = E_{总} - E_3 = \frac{1}{2}\mathrm{mv}_0{}^2 - E_3 \tag{1}$$

In the formula: the energy of the total automotive power, the energy lost during the car brake process.

After the turning of the fan wheel conversion:

$$E = \eta Q = E_1 + E_2 \tag{2}$$

In the formula: the energy after the fan wheel conversion is the efficiency of the fan wheel conversion, the energy stored in the flywheel, and the energy stored in the battery.

Because in this braking situation, it is very small, so you can ignore it when calculating the energy storage energy of the flywheel

Then:

$$E_1 = E = \frac{1}{2}J\omega^2 \tag{3}$$

In the formula: the rotation of the flywheel, the speed of the flywheel rotation angle speed.

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The energy lost during the car braking process is divided into two aspects: the energy that the car is dispersed from the action of air resistance during the braking process; Few, so it can be ignored when calculating.

The calculation formula of air resistance from the car theory is:

$$F_{\mathrm{w}} = \frac{C_D A \mu_{\mathrm{a}}^2}{21.15} \tag{4}$$

In the formula: the air resistance coefficient; A is the wind area of the vehicle; the speed of the vehicle. The energy consumed by the air resistance during the braking process is expressed by the energy:

$$E_{\mathrm{w}} = \int_0^{\mathrm{t}} F_{\mathrm{w}} \mathrm{ds} \tag{5}$$

In the formula: the time required for the braking process,; the vehicle is driving distance for the braking process.

The energy stored in the flywheel is subsequent.

(2) Driving at a uniform speed at a high to low -speed state and the car braking of the car until the stop state is not started for a long time. Under this working conditions, the system stores all the energy in the battery.

The calories stored in the car brakes are:

$$Q = E_{\text{总}} - E_2 = \frac{1}{2} \mathrm{m} v_0^{\ 2} - E_3 \tag{6}$$

In the formula: the energy of the total automotive power, the energy lost during the car brake process.

After the turnover of the fan wheel:

$$E = \eta Q = E_1 \tag{7}$$

In the formula: the energy after the fan wheel conversion, the efficiency of the fan wheel conversion, and the energy stored in the battery, then:

$$E_1 = E \tag{8}$$

2.3 Innovation

(1) The gas collecting fans of this device and the relevant pipelines are installed at the gas collecting fan. When there is wind, the battery and spare battery are powered by the wind, which can send more air to the inside. Can collect air.

(2) This device is equipped with a adsorption box that can control heating, and can collect hot air for 24 hours to ensure sufficient water collection efficiency. And the side of the adsorption box connects it with a water tube with a pipe. When the air enters the water tank, it can be pumped into the device of the present invention many times when the air enters the water tank to condense more efficiently.

(3) The catheter in the condenser of this device is a screw copper tube built -in copper wire. The hot air can be fully exposed to the surface of the material. It can speed up the heat dissipation to achieve

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the condensation effect, so that the water is efficiently condensed from the air and entered the water collection system.

3. Conclusion

The current social cars have almost become a necessity for families. With the increase of cars, the greenhouse effect is getting worse, and energy conservation and emission reduction have become a problem that people have to pay attention to. This system not only saves more energy for cars, but also greatly improves the safety and stability of the car when the car brakes. And can be widely used in today's brake cars. Both the brakes and the storage performance of this system are very stable and efficient. It can improve the vehicle's electrical economy and fuel economy, increase the mileage of automobiles, reduce the cost of the car, and reduce the exhaust emissions, so as to achieve the purpose of energy saving and emission reduction. Costly cater to the current theme of energy conservation and emission reduction. So both have a broad application prospect in both domestic and abroad.

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