

QUICK RELEASE ENERGY STORAGE SYSTEM AND METHOD OF REPLACING THE SAME FOR ELECTRIC MICRO MOBILITY DEVICE

TECHNICAL FIELD

The present invention relates generally to removable electrical energy storage systems of electric micro mobility devices, more particularly to electric kick scooters with a low profile propulsion system.

BACKGROUND OF THE INVENTION

Electric micro mobility device such as electric kick scooters has an electrical energy storage system that provide propulsion energy to the motor or motors. The electrical energy storage system (EESS) requires recharging after the energy has depleted over time or mileage. The process of charging the electrical energy storage system often takes up substantial amount of time leading to significant device downtime.

In addition, typical EESS of electric kick scooters are designed not to removable from the main body frame. When an electric kick scooter requires charging, it has to be brought to a special docking station or minimally a location with access to mains electricity. Electric kick scooters have limited real estate making it challenging to design a functional and reliable swappable battery feature.

It is hence desirable to introduce an electric kick scooter with an EESS that operates with low device downtime during charging or replacement of faulty battery for improved user experience.

Having swappable battery on electric kick scooters significantly reduces the device downtime due to recharging process or when replacing the faulty battery of the mobility device, thus allowing continuous usage of mobility device with extended mileage. Moreover, it is hassle free as compared to bringing the mobility device which can be heavy and bulky to a wall plug for charging hence improving the space efficiency. A cassette EESS could be stored anywhere, and a depleted charged EESS can be exchanged with a fully charged EESS within a short period of time without interrupting the user's journey.

SUMMARY OF THE INVENTION

A system and technique for quick release of an EESS, in the form of a removable battery pack of an electric kick scooter is disclosed. The EESS is a cassette which is adapted to be inserted in a designated space of the electric kick scooter housing.

Advantageously, placement of the quick release EESS cassette at the lowest point of the electric kick scooter keeps the centre gravity of the mobility device low for ease of manoeuvrability of the device and prevent topple.

BRIEF DESCRIPTION OF THE DRAWINGS

These and further features of the present invention will be apparent with reference to the following description and drawings, wherein:

FIG. 1 is a bottom perspective view of an electric kick scooter showing the location of its EESS;

FIGs. 2 and 3 illustrates the initial step of removing the retaining cover;

FIG. 4 illustrates the direction of movement of the original EESS so that it uncouples from the housing of the electric kick scooter;

FIG. 5 illustrates the direction of movement of the replacement EESS to an engaged position with respect to the housing of the electric kick scooter;

FIG. 6 is the bottom perspective view of the electric kick scooter with a replacement EESS in the engaged position;

FIGs. 7A and 7B are bottom views of an electric kick scooter of FIG 6 whereby the retaining cover has been reinserted and secured into the housing;

FIG. 8 is a bottom perspective view of the electric kick scooter of FIG 6 with the replacement EESS.

DETAILED DESCRIPTION

FIG. 1 shows the bottom perspective view of a quick release EESS cassette. The system includes housing deck 10, EESS cassette 20, retaining cover 30 and lock 40. Lock 40 is used to secure retaining cover 30 in its designated location and can be mechanically released by the user for example with the push of a button or electronically by a wireless controller.

FIGs. 2- 4 show the process of removing the EESS cassette 20 from the base of housing deck 10 for EESS replacement. FIG. 3 shows that lock 40 is released to enable retaining cover 30 to be removed from the housing deck 10 in the downwards direction. The removal of retaining cover 30 provides a gap for the EESS cassette 30 to axially slide backwards with respect to the housing deck 10 for removal. FIG. 4 shows the direction of the movement of EESS cassette 20 in order for it to be being removed from the housing deck 10 for replacement.

FIGs. 5- 8 show the process of installing a charged or working EESS cassette 20 into the housing deck 10. FIG. 5 shows EESS cassette 20 positioned in alignment to the base of housing deck 10. The EESS cassette 20 is then lifted upwards into the space of housing deck 10 adapted for receiving EESS cassette 20 and slid forward axially to engage electrical connection. FIGs. 7A and 7B shows retaining cover 30 reinserted into housing deck 10 to retain EESS cassette 20 in the engaged position and limit the movement of EESS cassette 20 in the axial direction. FIG. 8 shows the retaining cover 30 is secured with lock 40.

The EESS cassette 20 can be exchanged at a battery vending station or a manned physical store such a convenience store once it is depleted or faulty. The depleted battery is first deposited at the vending station or store where the battery characteristic and user information are retrieved. Users are required to use specific mobile application or other means of identification method to withdraw a fully charged EESS cassette 20 where the billing will be charged to the user.

CLAIMS

1. An electronic kick scooter with removable electrical energy storage system.