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Weather shield for a vehicle charge port

Abstract

A vehicle charge system includes a charge port having a charge port receptacle configured to transfer electrical energy from an electrical source to a vehicle battery. A door is pivotally mounted relative to the charge port receptacle. The door has an outer surface and an inner surface. A charge port shield includes a first surface and a second surface. The charge port shield is selectively supportable in the charge port and configured to provide a weather shield to the charge port receptacle.

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Background/Summary

INTRODUCTION

(1) The subject disclosure relates to electric vehicles and, more particularly, to a charge port weather shield for an electric vehicle.

(2) Electric vehicles include a charge port that is typically covered by a door. The door protects a charge receptacle from weather, dirt, and debris during driving and when parked outdoors. When charging, the door is opened and a charging device is connected to the charge receptacle. When the door is open, and the vehicle is charging out of doors, the charge receptacle may be exposed to weather. Rain, snow, and dirt accumulating between the charging device and the charge receptacle could affect charging efficiency. Accordingly, it is desirable to provide a device that shields vehicle charging components from the weather.

SUMMARY

(3) A vehicle charge system in accordance with a non-limiting example, includes a charge port having a charge port receptacle configured to transfer electrical energy from an electrical source to a vehicle battery. A door is pivotally mounted relative to the charge port receptacle. The door has an outer surface and an inner surface. A charge port shield includes a first surface and a second surface. The charge port shield is selectively supportable in the charge port and configured to provide a weather shield to the charge port receptacle.

(4) In addition to one or more of the features described herein the inner surface of the door includes a plurality of support elements and the first surface of the charge port shield includes a plurality of support members that interact with the plurality of support elements to selectively support the charge port shield on the inner surface of the door.

(5) In addition to one or more of the features described herein the plurality of support elements comprise hook receivers and the plurality of support members comprise hooks that selectively interact with the hook receivers to support the charge port shield on the inner surface of the door.

(6) In addition to one or more of the features described herein the hook receivers comprise openings formed in the inner surface of the door.

(7) In addition to one or more of the features described herein the plurality of support elements comprise magnets mounted to the inner surface of the door.

(8) In addition to one or more of the features described herein the plurality of support members comprise magnetic elements configured to be attracted to the magnets.

(9) In addition to one or more of the features described herein the magnetic elements comprise ferro-magnetic members.

(10) In addition to one or more of the features described herein the charge port shield includes an opening that is selectively receptive of the charge port receptacle.

- (11) In addition to one or more of the features described herein the charge port shield includes a tab element that projects into the opening.
- (12) In addition to one or more of the features described herein the charge port shield is formed from a flexible weather resistant material.
- (13) In accordance with another non-limiting example, a vehicle includes a body, an electric motor supported in the body, a rechargeable energy storage system (RESS) supported in the body, and a charge port including a charge port receptacle mounted to the body. The charge port being electrically connected to the RESS. A door is pivotally mounted to the body relative to the charge port receptacle. The door has an outer surface and an inner surface. A charge port shield includes a first surface and a second surface. The charge port shield is selectively supportable in the charge port and configured to provide a weather shield to the charge port receptacle.
- (14) In addition to one or more of the features described herein the inner surface of the door includes a plurality of support elements and the first surface of the charge port shield includes a plurality of support members that interact with the plurality of support elements to selectively support the charge port shield on the inner surface of the door.
- (15) In addition to one or more of the features described herein the plurality of support elements comprise hook receivers and the plurality of support members comprise hooks that selectively interact with the hook receivers to support the charge port shield on the inner surface of the door.
- (16) In addition to one or more of the features described herein the hook receivers comprise openings formed in the inner surface of the door.
- (17) In addition to one or more of the features described herein the plurality of support elements comprise magnets mounted to the inner surface of the door.
- (18) In addition to one or more of the features described herein the plurality of support members comprise magnetic elements configured to be attracted to the magnets.
- (19) In addition to one or more of the features described herein the magnetic elements comprise ferro-magnetic members.
- (20) In addition to one or more of the features described herein the charge port shield includes an opening that is selectively receptive of the charge port receptacle.
- (21) In addition to one or more of the features described herein the charge port shield includes a tab element that projects into the opening.
- (22) In addition to one or more of the features described herein the charge port shield is formed from a flexible weather resistant material.
- (23) The above features and advantages, and other features and advantages of the disclosure are readily apparent from the following detailed description when taken in connection with the accompanying drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

- (1) Other features, advantages and details appear, by way of example only, in the following detailed description, the detailed description referring to the drawings in which:
- (2) FIG. 1 is a left side view of a vehicle including a charge port weather shield, in accordance with a non-limiting example;
- (3) FIG. 2 is a perspective view of a charge port door of FIG. 1 supporting the charge port weather shield, in accordance with a non-limiting example;
- (4) FIG. 3 is a cross-sectional side view of the charge port door of FIG. 2, in accordance with a non-limiting example;
- (5) FIG. 4 is a cross-sectional side view of the charge port door of FIG. 2, in accordance with another non-limiting example;

- (6) FIG. 5 is a perspective view of a vehicle charge port with the charge port weather shield on a charge port door in an open configuration, in accordance with a non-limiting example;
- (7) FIG. 6 is a perspective view of the vehicle charge port of FIG. 5 showing the charge port weather shield positioned about a charge port receptacle, in accordance with a non-limiting example; and
- (8) FIG. 7 is a perspective view of a charging device connected to the charge port of FIG. 6 with the charge port shield protecting the charge port receptacle, in accordance with a non-limiting example.

DETAILED DESCRIPTION

(9) The following description is merely exemplary in nature and is not intended to limit the present disclosure, its application or uses. It should be understood that throughout the drawings, corresponding reference numerals indicate like or corresponding parts and features.

(10) A vehicle, in accordance with a non-limiting example, is indicated generally at **10** in FIG. 1. Vehicle **10** includes a body **12** supported on a frame (not shown) and a plurality of wheels, one of which is indicated at **16**. Body **12** includes a passenger compartment **20** that includes a driver's seat **22** and at least one rear passenger seat **24**. Vehicle **10** takes the form of an electric vehicle (EV) **28** including a charge port **30** having a door **32** that is selectively pivotally mounted to body **12**. Charge port **30** includes a charge port receptacle **34** that serves as an interface between an external charging device **36** (FIG. 7) and a rechargeable energy storage system (RESS) **38** supported in body **12**. External charging device **36** forms part of a charging station (not shown) that provides electric energy stored in RESS **38**. RESS **38** is operatively connected to an electric motor **40** that provides motive power to vehicle **10**.

(11) Referring to FIG. 2 and with continued reference to FIG. 1, door **32** includes an outer surface **44** (FIG. 1) and an inner surface **46**. In accordance with a non-limiting example, a charge port shield **50** is selectively supported on inner surface **46**. As will become more fully evident herein, charge port shield **50** may be arranged about charge port receptacle **34** during a charging operation. Charge port shield **50** is formed from a flexible weather resistant material and includes a first surface **52** (FIG. 3) and a second surface **53**. Charge port shield **50** protects charge port receptacle **34** from weather, dust, debris and the like when charging vehicle **10** outdoors in an area unprotected from weather.

(12) In a non-limiting example illustrated in FIG. 3, inner surface **46** of door **32** includes a plurality of support elements **55** and charge port shield **50** includes a plurality of support members **57** arranged on first surface **52**. Support elements **55** interact with support members **57** to selectively support charge port shield **50** on inner surface **46** when not in use. In this manner, charge port shield **50** is readily available when needed. In one non-limiting example, plurality of support members **57** take the form of hook receivers **60** which are shown as openings (not separately labeled) formed in inner surface **46**. Plurality of support elements **55** take the form of hooks **64** that pass into hook receivers **60** to suspend charge port shield **50** on inner surface **46**.

(13) In another non-limiting example, the plurality of support elements **55** arranged on inner surface **46** take the form of magnets **68** as shown in FIG. 4. The plurality of support members **57** take the form of magnetic elements **70** that are attracted to magnets **68**. (or inner surface **46** of charge port door **32**). That is, while inner surface **46** is shown to include magnets, if door **32** is formed from a ferro-magnetic material, additional magnets may not be employed. In a non-limiting example, magnetic elements **70** may take the form of a ferro-magnetic members (not separately labeled) including metals, such as iron, cobalt, and/or compositions thereof having a magnetic property. In the non-limiting example shown, magnet elements **70** are attracted to and connect with magnets **68** to support charge port shield **50** on inner surface **46** when not in use.

(14) As shown in FIG. 5, charge port shield **50** includes an opening **77** that has a shape which corresponds to charge port receptacle **34**. In a non-limiting example, charge port shield **50** is selectively supportable in charge port **30** with opening **77** being receptive of charge port receptacle

34. Charge port shield 50 may also include a tab element 80 that extends into opening 77. With this arrangement, when charge port shield 50 is mounted in charge port 30, tab element 80 engages with charge port receptacle 34 as shown in FIG. 6. In this manner, charge port shield 50 is held in place until a charging device is connected to charge port receptacle 34 to deliver electrical energy from an electrical source to RESS 38 as shown in FIG. 7.

(15) At this point, it should be appreciated that the charge port shield may be deployed during outdoor charging cycles when the vehicle is exposed to weather. The charge port shield will reduce rain and snow infiltration to the charge port receptacle that may have a negative impact on charging efficiency. Charge port shield may be stored on the charge door 32 for ready access when needed or may be stored in the passenger compartment. The charge port shield is designed to be retained to the charging receptacle while accommodating a wide array of charging device shapes.

(16) The terms “a” and “an” do not denote a limitation of quantity, but rather denote the presence of at least one of the referenced item. The term “or” means “and/or” unless clearly indicated otherwise by context. Reference throughout the specification to “an aspect”, means that a particular element (e.g., feature, structure, step, or characteristic) described in connection with the aspect is included in at least one aspect described herein, and may or may not be present in other aspects. In addition, it is to be understood that the described elements may be combined in any suitable manner in the various aspects.

(17) When an element such as a layer, film, region, or substrate is referred to as being “on” another element, it can be directly on the other element or intervening elements may also be present. In contrast, when an element is referred to as being “directly on” another element, there are no intervening elements present.

(18) Unless specified to the contrary herein, all test standards are the most recent standard in effect as of the filing date of this application, or, if priority is claimed, the filing date of the earliest priority application in which the test standard appears.

(19) Unless defined otherwise, technical, and scientific terms used herein have the same meaning as is commonly understood by one of skill in the art to which this disclosure belongs.

(20) While the above disclosure has been described with reference to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from its scope. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the disclosure without departing from the essential scope thereof. Therefore, it is intended that the present disclosure not be limited to the particular embodiments disclosed, but will include all embodiments falling within the scope thereof.

Claims

1. A vehicle charge system comprising: a charge port including a charge port receptacle configured to transfer electrical energy from an electrical source to a vehicle battery; a door pivotally mounted relative to the charge port receptacle, the door having an outer surface and an inner surface; and a charge port shield including a first surface and a second surface, wherein the charge port shield is selectively supportable in the charge port and moveable between a first configuration in which the charge port shield is attached to the inner surface of the door and a second configuration in which the charge port shield is detached from the door and attached to the charge port to provide a weather shield to the charge port receptacle.

2. The vehicle charge system according to claim 1, wherein the inner surface of the door includes a plurality of support elements and the first surface of the charge port shield includes a plurality of support members that interact with the plurality of support elements to selectively support the charge port shield on the inner surface of the door.

3. The vehicle charge system according to claim 2, wherein the plurality of support elements

- comprise hook receivers and the plurality of support members comprise hooks that selectively interact with the hook receivers to support the charge port shield on the inner surface of the door.
4. The vehicle charge system according to claim 3, wherein the hook receivers comprise openings formed in the inner surface of the door.
5. The vehicle charge system according to claim 2, wherein the plurality of support elements comprise magnets mounted to the inner surface of the door.
6. The vehicle charge system according to claim 5, wherein the plurality of support members comprise magnetic elements configured to be attracted to the magnets.
7. The vehicle charge system according to claim 6, wherein the magnetic elements comprise ferro-magnetic members.
8. The vehicle charge system according to claim 1, wherein the charge port shield includes an opening that is selectively receptive of the charge port receptacle.
9. A vehicle charge system comprising: a charge port including a charge port receptacle configured to transfer electrical energy from an electrical source to a vehicle battery; a door pivotally mounted relative to the charge port receptacle, the door having an outer surface and an inner surface; and a charge port shield including a first surface and a second surface, the charge port shield being selectively supportable in the charge port and configured to provide a weather shield to the charge port receptacle, wherein the charge port shield includes an opening that is selectively receptive of the charge port receptacle, and wherein the charge port shield includes a tab element that projects into the opening.
10. The vehicle charge system according to claim 1, wherein the charge port shield is formed from a flexible weather resistant material.
11. A vehicle comprising: a body; an electric motor supported in the body; a rechargeable energy storage system (RESS) supported in the body; a charge port including a charge port receptacle mounted to the body, the charge port being electrically connected to the RESS; a door pivotally mounted to the body relative to the charge port receptacle, the door having an outer surface and an inner surface; and a charge port shield including a first surface and a second surface, wherein the charge port shield is selectively supportable in the charge port and moveable between a first configuration in which the charge port shield is attached to the inner surface of the door and a second configuration in which the charge port shield is detached from the door and attached to the charge port to provide a weather shield to the charge port receptacle.
12. The vehicle according to claim 11, wherein the inner surface of the door includes a plurality of support elements and the first surface of the charge port shield includes a plurality of support members that interact with the plurality of support elements to selectively support the charge port shield on the inner surface of the door.
13. The vehicle according to claim 12, wherein the plurality of support elements comprise hook receivers and the plurality of support members comprise hooks that selectively interact with the hook receivers to support the charge port shield on the inner surface of the door.
14. The vehicle according to claim 13, wherein the hook receivers comprise openings formed in the inner surface of the door.
15. The vehicle according to claim 12, wherein the plurality of support elements comprise magnets mounted to the inner surface of the door.
16. The vehicle according to claim 15, wherein the plurality of support members comprise magnetic elements configured to be attracted to the magnets.
17. The vehicle according to claim 16, wherein the magnetic elements comprise ferro-magnetic members.
18. The vehicle according to claim 11, wherein the charge port shield includes an opening that is selectively receptive of the charge port receptacle.
19. The vehicle according to claim 18, wherein the charge port shield includes a tab element that projects into the opening.

20. The vehicle according to claim 11, wherein the charge port shield is formed from a flexible weather resistant material.
