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(54) DETACHABLE STRUCTURE OF A CHASSIS

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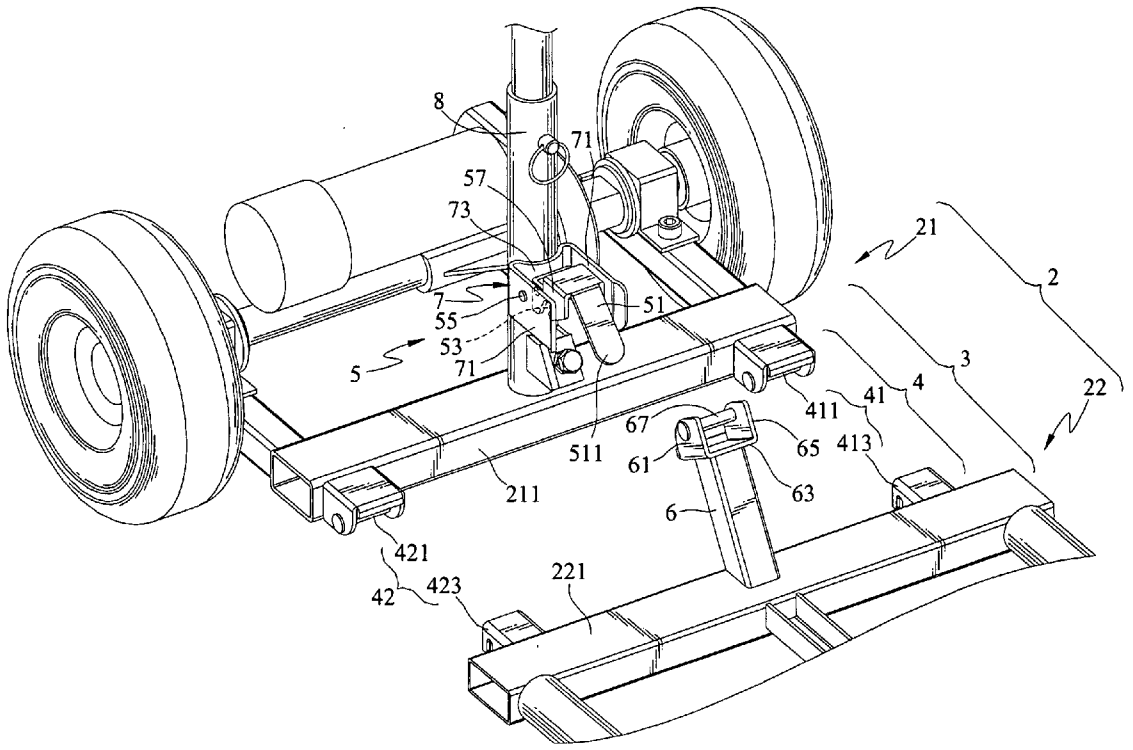
(57) ABSTRACT

A detachable structure of a chassis for use with a light-duty electric vehicle is disclosed. The detachable structure comprises a first framework, a second framework and a fastening device which connects the first framework to the second framework. The fastening device includes a coupling device, a first fastener, and a second fastener. The coupling device is arranged by coupling at least a recess in a transverse bar, whereas the first fastener is configured as a pivoting hook being fastened onto the second fastener which is configured as a transverse rod.



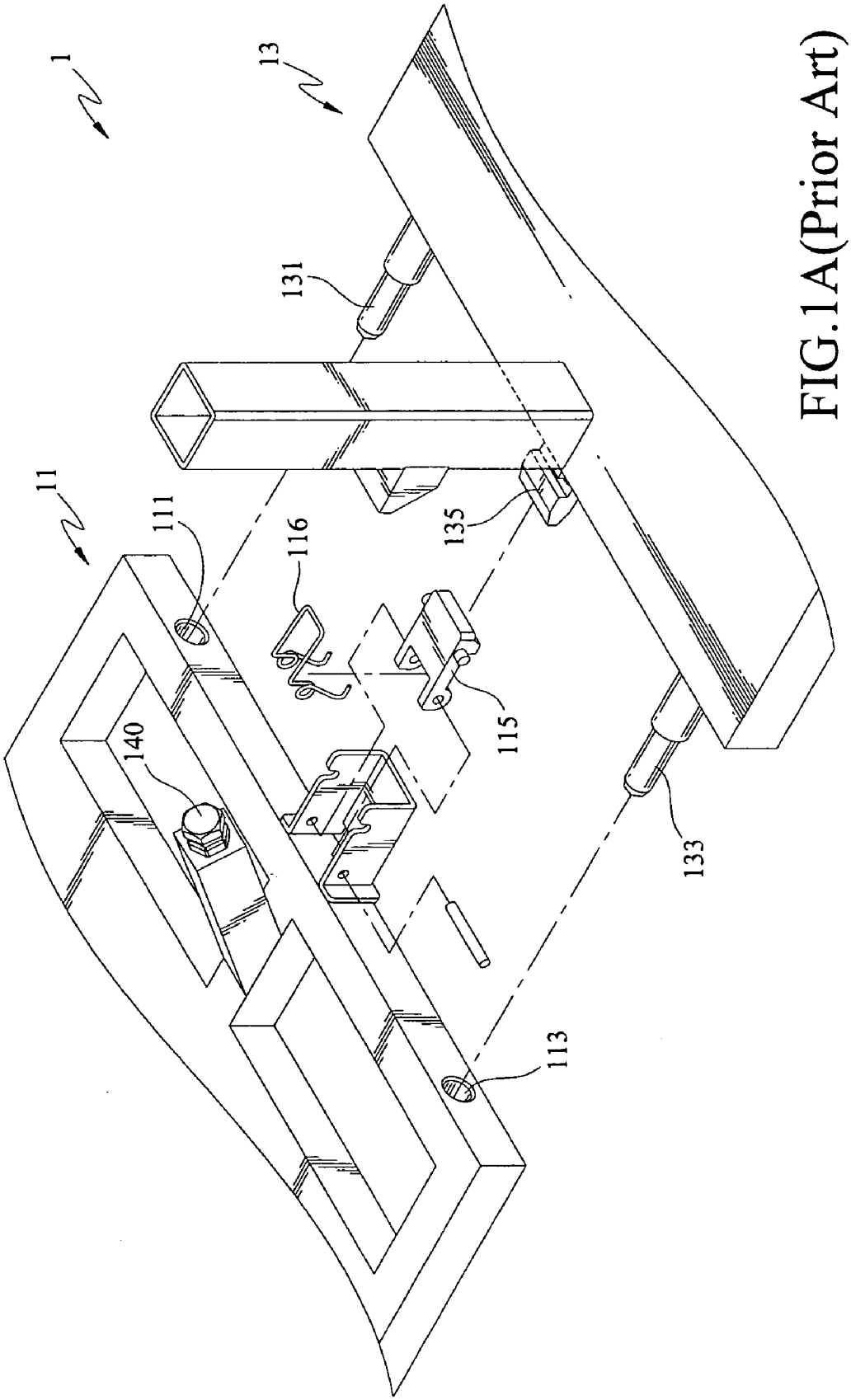


FIG.1A(Prior Art)

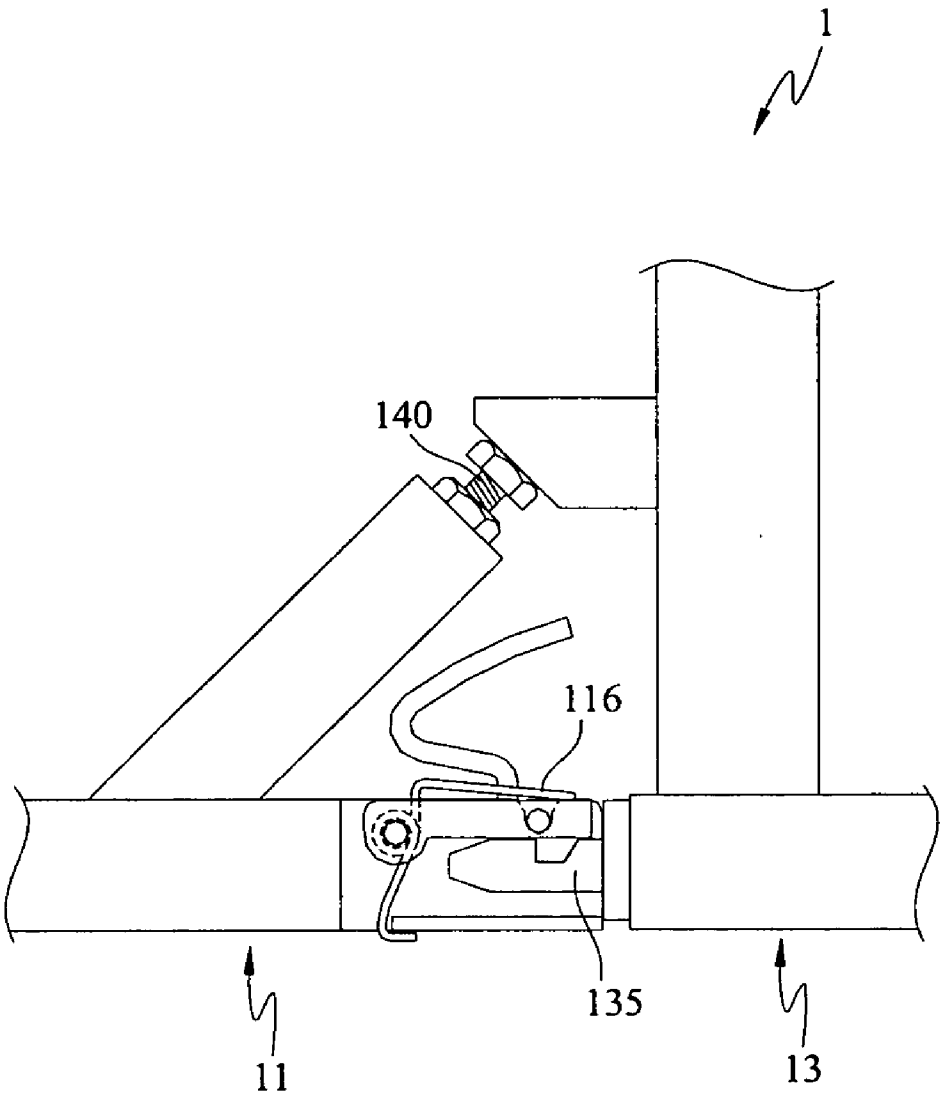


FIG.1B(Prior Art)

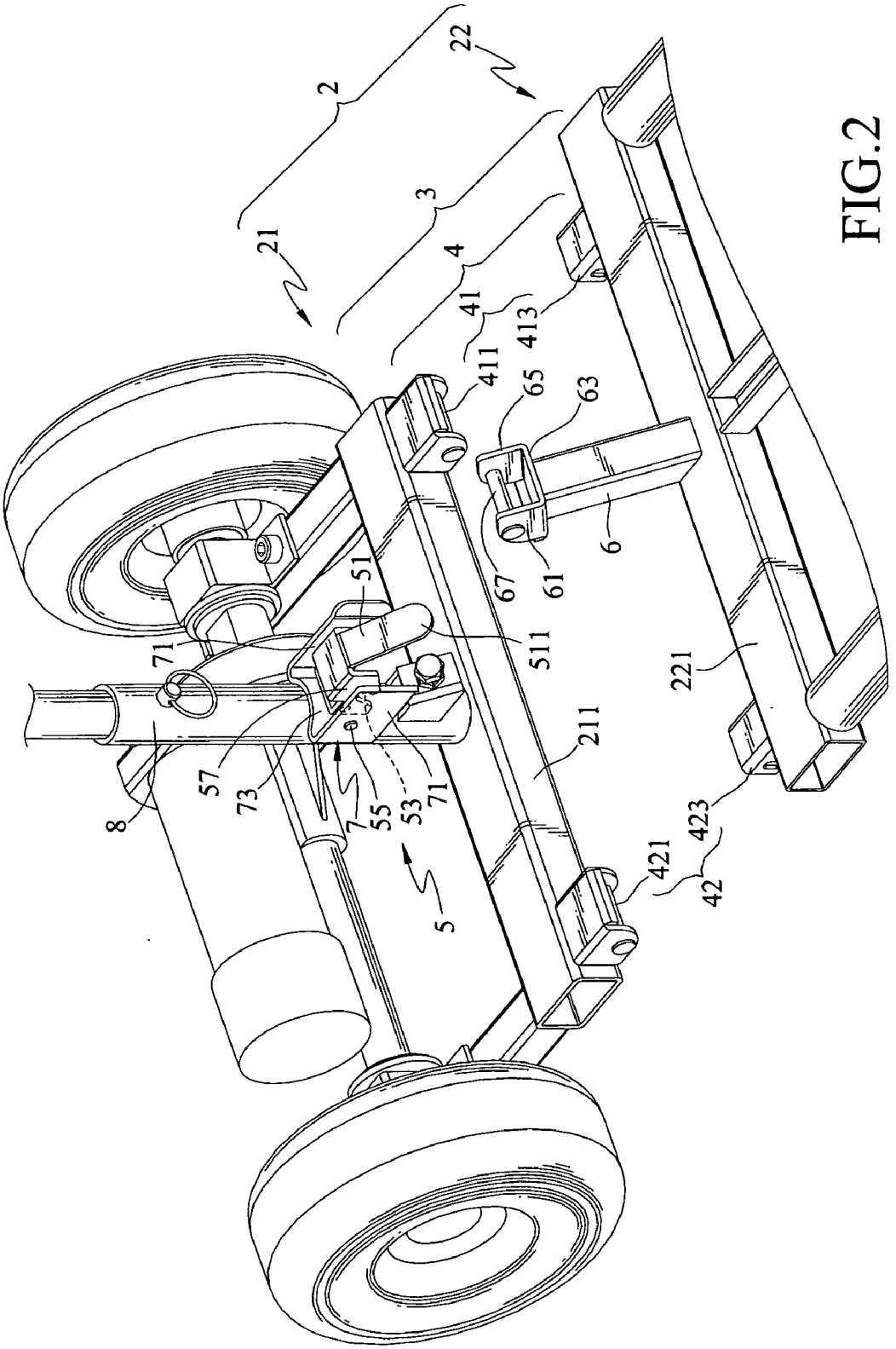

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FIG.2

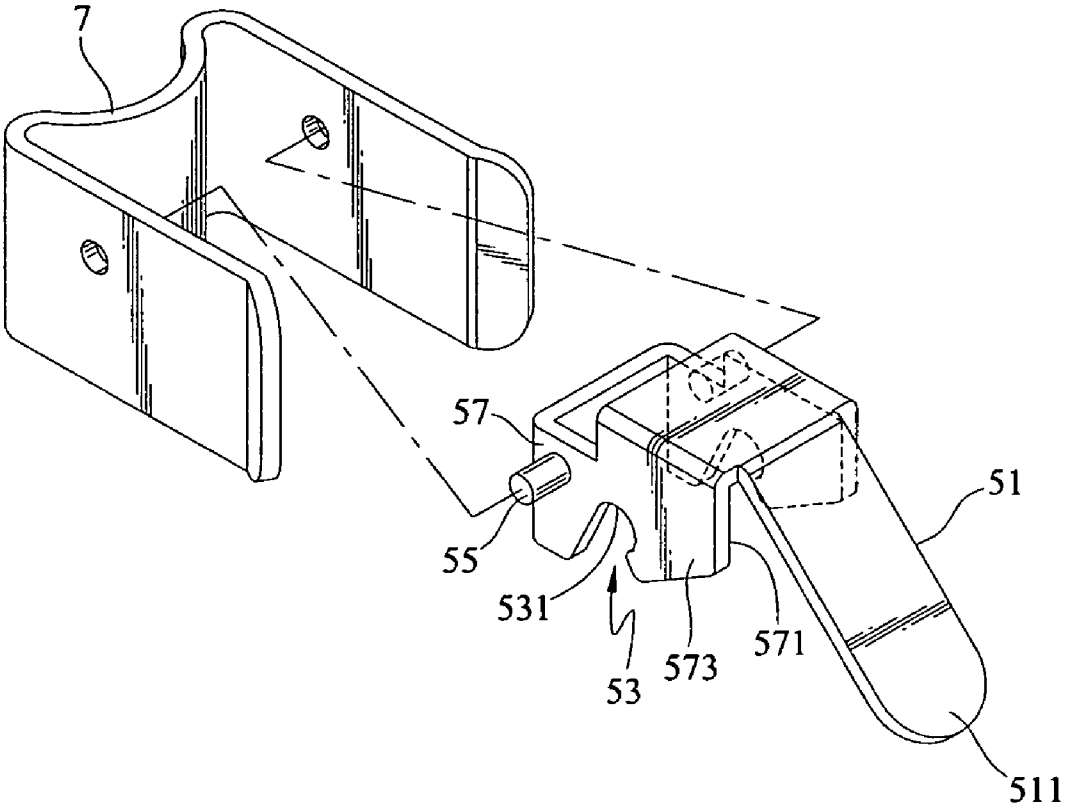

FIG.3

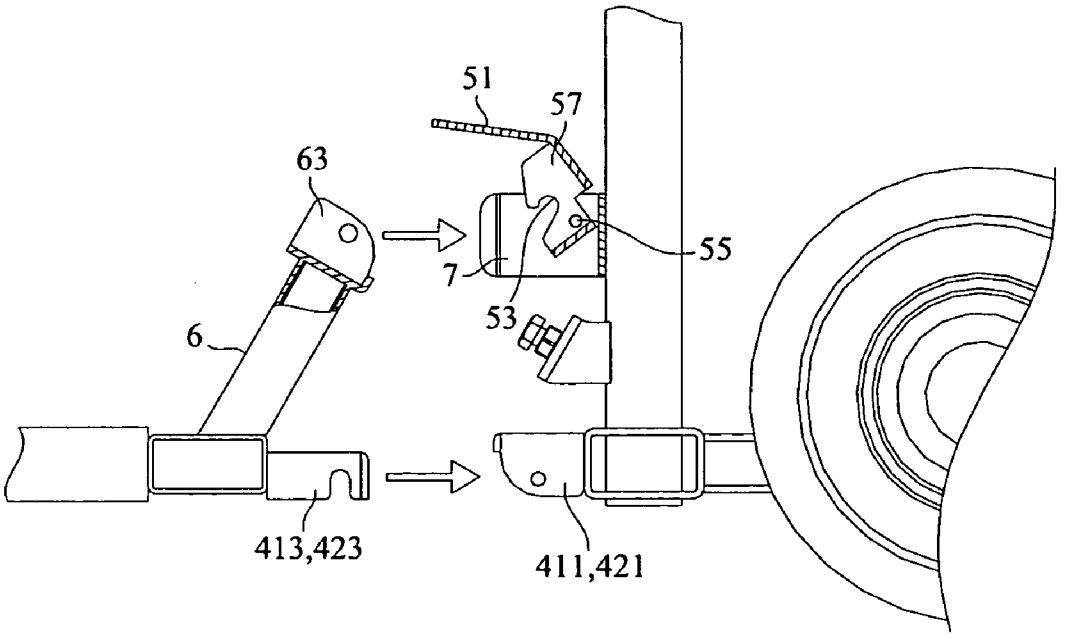

FIG.4

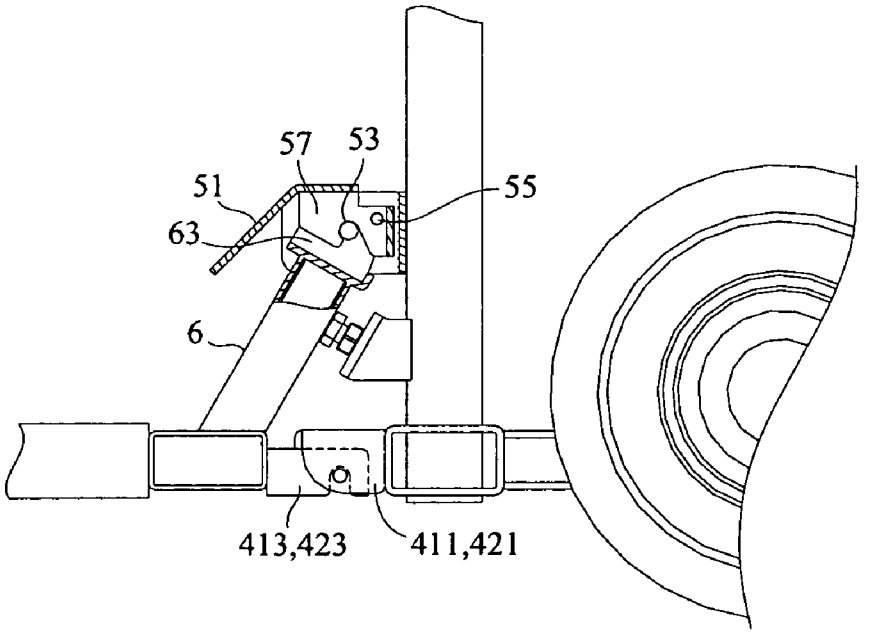

FIG.5

DETACHABLE STRUCTURE OF A CHASSIS

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This application is a cross reference to U.S. Ser. No. 11/035,448 filed on Jan. 14, 2005, which corresponds to Taiwan Patent Application No. 093216989 filed on Oct. 26, 2004.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable

BACKGROUND OF THE INVENTION

[0003] 1. Field of the Invention

[0004] The present invention relates to a detachable structure of a chassis, more specifically, to a detachable structure of a chassis of a light-duty electric vehicle.

[0005] 2. Descriptions of the Related Art

[0006] A light-duty electric vehicle (e.g. bike or tricycle) has been well developed for transporting old aged/handicapped persons. It has a relatively compact size, and can be easily stored. This kind of vehicle is easy to control and may contribute to environmental protection. Due to a need of being carried easily out for use outdoors, or received in a limited space, like in the truck of an automobile, the conventional design for the chassis of such a vehicle has been changed from an integral to a detachable structure, so as to reduce the size to be stored.

[0007] **FIGS. 1A and 1B** show an example of typical detachable structure **1** of a chassis. It comprises a front structure **11** and a rear structure **13** detachably connecting the front structure **11**. The front structure **11** comprises two holes **111**, **113** and two rods **131**, **133** disposed on the rear structure **13** are able to be inserted into the holes **111**, **113** for making the front structure **11** and the rear structure **13** in an engagement position. The detachable structure **1** also comprises a locking device composed of at least a hook device **115**, **135** and a torsion spring device **116** for resiliently returning the pivoting hook **53** in an engagement position, a flatness adjustable device **140**, and other suitable components to detachably engage the front structure **11** with the rear structure **13**.

[0008] Nevertheless, in view of the ease for a user's assembling the detachable structure, there is a big room of improvement for such kind of design. By way of example, in the conventional structure **1**, as the allowance for a male and female engagement by a rod-hole fitting, the alignment between the straight rods **131**, **133** and the holes **111**, **113** is inconvenient for a user to perform because of their limited sizes. In addition, when the vehicle carries a person, the forces distributing onto the surface of the straight rods **131**, **133** are not uniform. Specifically, forces concentrated at the local area of the rods **131**, **133** may bring stress concentration and even cause rupture. Furthermore, the stability and rigidity after the assembling of the front structure **11** and the rear structure **13** in such a way can still be improved.

[0009] Given the above, a novel detachable structure for providing a more reliable construction and convenient operation for user's assembling the detachable structure is needed to be developed in this field.

SUMMARY OF THE INVENTION

[0010] The objective of the present invention is to provide a detachable structure of a chassis which facilitates the user's manual engagement of the detachable structure, and promotes the reliability and rigidity of the vehicle after being engaged.

[0011] The detachable structure comprises a first framework, a second framework and a fastening device whereby the fastening device detachably connects the first framework to the second framework. The fastening device includes a coupling device, a first fastener and a second fastener wherein the coupling device detachably connects the first framework with the second framework. The coupling device includes at least a coupler which is disposed between the first framework and the second framework. The coupler includes a transverse bar disposed on one of the frameworks and a recess disposed on the other framework for receiving the transverse bar, whereby the first framework and the second framework completely constitutes the chassis after the transverse bar engages in the recess in position. The first fastener has a pivoting handle which is provided with a female unit, and the second fastener has a male unit which is adapted to be engaged in the female unit of the first fastener after the coupling device connects the first framework with the second framework.

[0012] The detailed technology and preferred embodiments implemented for the subject invention are described in the following paragraphs accompanying the appended drawings for people skilled in this field to well appreciate the features of the claimed invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] **FIG. 1A** is a schematic diagram illustrating a typical detachable structure of a chassis;

[0014] **FIG. 1B** is a schematic diagram illustrating a typical detachable structure of a chassis after engagement;

[0015] **FIG. 2** is a schematic diagram illustrating the detachable structure of a chassis according to the present invention;

[0016] **FIG. 3** is a schematic diagram illustrating the first fastener of the detachable structure according to the present invention;

[0017] **FIG. 4** is a side view showing the detachable structure before engagement according to the present invention; and

[0018] **FIG. 5** is a side view showing the detachable structure after engagement according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0019] A detachable structure of the present invention is shown in **FIG. 2**. The detachable structure **2** of a chassis comprises a first framework **21**, a second framework **22** and a fastening device **3**. The fastening device **3** further includes a coupling device **4**, a first fastener **5** and a second fastener

6 whereby the coupling device 4 detachably connects the first framework 21 with the second framework 22. The first fastener 5 has a pivoting handle 51 which is provided with a female unit 53. The second fastener 6 has a male unit 61 which is adapted to be engaged in the female unit 53 of the first fastener 5 after the coupling device 4 connects the first framework 21 with the second framework 22.

[0020] Moreover, the coupling device 4 includes a first coupler 41 which is disposed between the first framework 21 and the second framework 22 for provisionally connecting them together, whereby the first framework 21 and the second framework 22 completely constitutes the useful chassis. To have the detachable mechanism being more stable and rigid, the coupling device 4 further comprises a second coupler 42 which is also disposed between the first framework 21 and the second framework 22. Preferably, the first coupler 41 is disposed at an opposite end of the second coupler 42, with respect to the first fastener 5 and second fastener 6. More specifically, the first framework 21 has a first end 211 and the second framework 22 further has a second end 221. The first end 211 and the second end 221 are substantially adjacent when the coupling device 4 connects the first framework 21 with the second framework 22. In other words, the coupling device 4 connects the first end 211 with the second end 221.

[0021] Each of the first coupler 41 and the second coupler 42 includes a male coupler and a female coupler to receive the male coupler. Preferably, the first coupler 41 has a first male coupler 411 and a first female coupler 413, and the second coupler 42 has a second male coupler 421 and a second female coupler 423, whereby the first framework 21 and the second framework 22 completely constitutes the chassis after the male couplers 411, 421 engage the female couplers 413, 423 in position.

[0022] More preferably, each of the first male coupler 411 and the second male coupler 421 is a transverse bar, whereas each of first female coupler 413 and the second female coupler 423 is a recess which is adapted to receive the transverse bar. The recess is able to contain the transverse bar therein for pivoting movement and engage the first framework 21 with the second framework 22 without substantial linear displacement after engagement. The engaging way of the couplers makes the user, especially old aged/handicapped user, be easier to position the first framework 21 and the second framework 22 without too many efforts of assembling the detached structures at the first opportunity that the users would like to use the vehicle.

[0023] In view of a preferred detailed structure, the first fastener 5 described above further comprises a first bracket 7 which has two opposing sidewalls 71 and a fixing plate 73 connecting therebetween, of which the sidewalls 71 and the fixing plate 73 define a space for receiving the pivoting handle 51 which pivots between the sidewalls 71.

[0024] More preferably, the female unit 53 disposed on the pivoting handle 51 of the first fastener 5 is a hook assembly 531, and the male unit 61 of the second fastener 6 is a transverse rod 67 which is suitable for coupling with the hook assembly 531 (see FIG. 4). The first fastener 5 engages with the second fastener 6 when the transverse rod 67 is contained within the hook assembly 531 by operating the pivoting handle 51 all the way down in a dead lock position (see FIG. 5).

[0025] In view of a further detailed preferable structure, the pivoting handle 51, as shown in FIGS. 3-5, comprises two pivoting shafts 55 and two opposing sidewalls 57. Each of the opposing sidewalls 57 has an inner end 571 and an outer end 573. Each of the pivoting shafts 55 has two ends with one end thereof being fixed onto the outer end 573 of one of the sidewalls 57 of the pivoting handle 51, and the other end pivoting onto the respective sidewall of the first bracket 7, whereby the pivoting handle 51 pivotally disposed in the bracket 7.

[0026] The hook assembly 531 described above further includes two parallel hooks formed on the two sidewalls 57 of the pivoting handle 51. The recess of the hook is disposed on the bottom side for coupling with the transverse rod 67 of the male unit 61 of the second fastener 6.

[0027] Besides, the second fastener 6 comprises a second bracket 63 having two opposing sidewalls 65 between which the transverse rod 67 is disposed. The transverse rod 67 is suitable for coupling with the recess of the hook assembly 531.

[0028] The pivoting handle 51 further comprises a handlebar 511 disposed between the sidewalls 57 thereof to facilitate a user's operation. After the first coupler 41 and the second coupler 42 are connected together, a user could pivot the pivoting handle 51 by operating the handlebar 511. The second fastener 6 could be contained within the space defined by the bracket 7. Then, the first fastener 5 and the second fastener 6 are mutually engaged after the user presses down the pivoting handle 51. Thus, two detached frameworks of the chassis are joined together as an integral structure under the state of use.

[0029] In addition, the chassis of the present invention preferably further comprise a seat support 8 vertically disposed on the first end 211 of the first framework 21. The first fastener 5 is disposed on the seat support 8 with the fixing plate 73 of the bracket 7 being mounted on a surface thereof.

[0030] FIG. 4 is a side view of the detachable structure of the present invention, whereas FIG. 5 shows a view after engagement. After the male couplers 411, 421 engages the female couplers 413, 423 to connect the first framework 21 with the second framework 22 in the engagement position, the hook assembly 531 of the pivoting handle 51 is adapted to be operated on a position for receiving the transverse rod 67 of the second fastener 6.

[0031] The above disclosure is related to the preferred technical contents and inventive features thereof. People skilled in this field may proceed with a variety of modifications and replacements based on the disclosures and suggestions of the invention as described without departing from the characteristics thereof. For example, the male and female components arranged on the first and second frameworks in a reverse way, and the amount of the fasteners and couplers are changed for specific concerns. Although such modifications and replacements are not fully disclosed in the above descriptions, they have substantially been covered in the following claims as appended.

What is claimed is:

1. A detachable structure of a chassis, comprising:

a first framework;

a second framework;

a fastening device, detachably connecting the first framework to the second framework; wherein the fastening device includes:

a coupling device, including a first coupler disposed for provisionally connecting the first framework and the second framework, the first coupler including a transverse bar and a recess for receiving the transverse bar; whereby the first framework and the second framework completely constitutes the chassis after the transverse bar engages in the recess in position;

a first fastener, having a pivoting handle which is provided with a female unit;

a second fastener, having a male unit, being adapted to be engaged in the female unit of the first fastener after the coupling device connects the first framework with the second framework.

2. The detachable structure of a chassis as claimed in claim 1, wherein the coupling device further comprises a second coupler disposed for provisionally connecting the first framework and the second framework, the second coupler includes a transverse bar and a recess for receiving the transverse bar, whereby the first framework and the second framework completely constitutes the chassis after the transverse bar of each of the first and second couplers engages in the recess of each of first coupler and second couplers in position.

3. The detachable structure of a chassis as claimed in claim 2, wherein the first coupler opposes to the second coupler with respect to the first fastener and second fastener.

4. The detachable structure of a chassis as claimed in claim 1, wherein the first framework has a first end and the second framework has a second end, and the coupling device connects the first end to the second end.

5. The detachable structure of a chassis as claimed in claim 4, wherein the first fastener further comprises a first bracket which has two opposing sidewalls and a fixing plate connecting therebetween, of which the sidewalls and the fixing plate define a space for receiving the pivoting handle which pivots between the sidewalls.

6. The detachable structure of a chassis as claimed in claim 5, wherein the female unit disposed on the pivoting handle is a hook assembly, and the male unit of the second fastener is a transverse rod.

7. The detachable structure of a chassis as claimed in claim 6, wherein the pivoting handle further comprises two pivoting shafts and two opposing sidewalls each having an inner end and an outer end, in which each of the pivoting shafts has two ends with one end thereof being fixed onto the outer end of one of the sidewalls of the pivoting handle, and the other end pivoting onto the respective sidewall of the first bracket.

8. The detachable structure of a chassis as claimed in claim 7, wherein the hook assembly includes two parallel hooks formed on the two sidewalls of the pivoting handle.

9. The detachable structure of a chassis as claimed in claim 8, wherein the second fastener further comprises a second bracket having two opposing sidewalls between which the transverse rod is disposed.

10. The detachable structure of a chassis as claimed in claim 5, wherein the pivoting handle further comprises a handlebar disposed between the sidewalls thereof to facilitate a user's operation.

11. The detachable structure of a chassis as claimed in claim 5, further comprising a seat support vertically disposed on the first end of the first framework, in which the first fastener is disposed on the seat support with the fixing plate of the bracket being mounted on a surface thereof.

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