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(71) Applicant: TVS MOTOR COMPANY LIMITED
[IN/IN]; Jayalakshmi Estates, No.29 (Old No.8), Haddows Road, Chennai 600 006 (IN).

(72) Inventors: ANURAG, Khandual; TVS MOTOR COMPANY LIMITED, Jayalakshmi Estates, No.29 (Old No.8), Haddows Road, Chennai 600 006 (IN). KUMAR, Surendiran; TVS MOTOR COMPANY LIMITED, Jayalakshmi Estates, No.29 (Old No.8), Haddows Road, Chennai 600 006 (IN). BALAGURU, Sridhar; TVS MOTOR COMPANY LIMITED, Jayalakshmi Estates, No.29 (Old No.8), Haddows Road, Chennai 600 006 (IN).

RENGARJAN, Babu; TVS MOTOR COMPANY LIMITED, Jayalakshmi Estates, No.29 (Old No.8), Haddows Road, Chennai 600 006 (IN).

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[Continued on next page]

(54) Title: A TWO-WHEELED VEHICLE

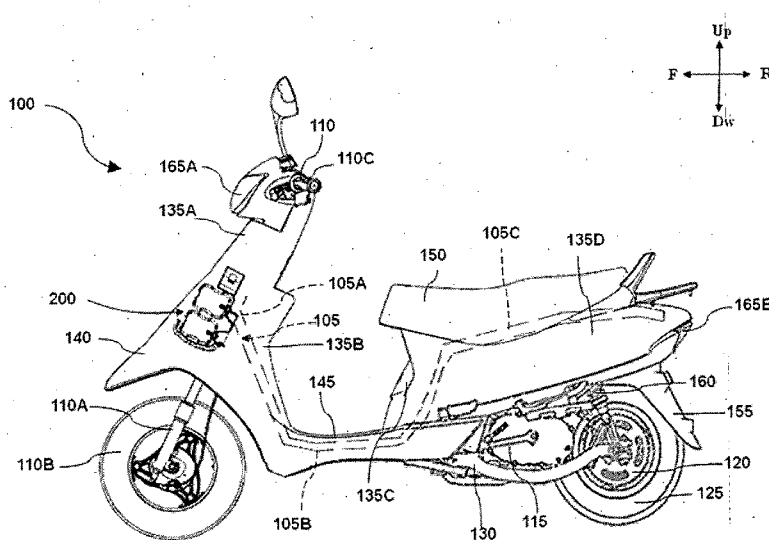


Fig. 1

(57) Abstract: The present subject matter provides a two-wheeled vehicle comprising a frame assembly. The frame assembly includes a head tube (105A) and a main tube (105B). A traction motor functionally coupled to at least one wheel of said vehicle. The frame assembly further comprises a battery-mounting member (200) comprising a base portion (205) and one or more mounting portion(s) (210A, 210B) connected thereto. The battery-mounting member (200, 300) is at least partially supported by said head tube (105A) through said base member (205). The one or more mounting portion(s) (210A, 210B) are capable of detachably-supporting the one or more auxiliary power source(s) (170A, 170B). The battery-mounting member (200) thereby provides a rigid yet compact battery supporting structure.

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A TWO-WHEELED VEHICLE

TECHNICAL FIELD

[0001] The present subject matter relates generally to two-wheeled vehicles, and more particularly, but not exclusively, to vehicles incorporating a traction motor.

BACKGROUND

[0002] Generally, in an electric vehicle a traction motor is provided. The traction motor acts as power unit for the vehicle that drives wheel(s) of the vehicle. In a hybrid vehicle, the power unit includes an internal combustion engine along with the traction motor. The hybrid vehicle when operated using only the traction motor, operates similar to the electric vehicle. Typically, an auxiliary power source, for example a battery, drives the traction motor. The battery provided on the vehicle is of a large size when compared to conventional battery available on a conventional two-wheeler.

[0003] Further, in case of a two-wheeled vehicle with a step-through frame assembly, the vehicle comprises of a floorboard and a utility space. Moreover, in case of the hybrid vehicle, the engine is mounted to the frame assembly, which requires space for locating the engine and for parts that work in conjunction with the engine. The aforementioned vehicles viz. electric or hybrid, with a step-through frame assembly requires optimum location of the battery.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The detailed description of the present subject matter is described with reference to the accompanying figures. Same numbers are used throughout the drawings to reference like features and components.

[0005] **Fig. 1** illustrates a left side view of an exemplary vehicle, in accordance with an embodiment of the present subject matter.

[0006] **Fig. 2 (a)** illustrates left side perspective view of a portion of the frame assembly employed with a battery-mounting member, in accordance with an embodiment of the subject matter.

[0007] **Fig. 2 (b)** illustrates a right side perspective view of the frame assembly employed with the battery-mounting member in accordance with the embodiment depicted in **Fig. 2 (a)**

[0008] **Fig. 2 (c)** depicts a left side view of the battery mounted to the battery-mounted member.

[0009] **Fig. 3 (a)** illustrates a left side view of the frame assembly employed with a battery-mounting member, in accordance with another embodiment of the present subject matter.

[00010] **Fig. 3 (b)** depicts a left side perspective view of a front portion of the vehicle in accordance with the embodiment depicted in **Fig. 3 (a)**.

DETAILED DESCRIPTION

[00011] Typically, vehicles with a step-through type frame assembly include a head tube and a main frame. The vehicle may have the engine, which is mounted to the frame assembly. Typically, the engine being the power unit is swingably connected to the main frame. Also, the power unit is coupled to the drive wheel, which is generally the rear wheel. Also, the traction motor is disposed in the rear portion of the vehicle and the traction motor is functionally coupled to the rear wheel. The presence of the power unit and other vehicle parts that work in conjunction with the engine viz. air filter assembly, fuel tank, results in compact package of aforementioned components in the rear portion of the vehicle. To this end, vehicles with traction motor are driven by a high capacity battery. The challenge is to accommodate the high capacity battery within the vehicle without comprising on space of other components.

[00012] Moreover, the step-through type vehicle comprises utility space that is provided below a seat assembly. Therefore, providing the battery below the seat assembly results in comprising the utility space of the vehicle. Also, the

battery, provided below the seat assembly is, subjected to heat radiation from the engine that would affect functioning of the battery, especially in case of the hybrid vehicles. Further, the vehicle may have one or more batteries, which are to be replaced for charging or maintenance. Therefore, there is also a need for providing ease of access and mounting.

[00013] Thus, there is a need for a vehicle, which is capable of accommodating the various components of the vehicle, without compromising on the utility space of the vehicle. Further, the vehicle should be capable of providing ease of access to batteries or the like.

[00014] Hence, an objective of the present subject matter is to provide a two-wheeled vehicle. The said vehicle is employed with a battery-mounting member that is capable of supporting one or more batteries. According to one aspect, the utility space on the vehicle is not compromised. According to another aspect, the battery-mounting member is compact and is of low-cost.

[00015] According to additional aspect, ease of mounting and un-mounting the battery is provided that reduces assembly time and maintenance time. Further, the battery can be cooled naturally, as they are disposed substantially in the front portion of the vehicle.

[00016] In yet another additional aspect, the base portion is secured substantially at a mid-portion along axial length of the head tube. The batteries are disposed on either sides of the mid-portion.

[00017] In an embodiment, a two-wheeled vehicle is provided. The vehicle comprises a power unit that includes a traction motor. Further, the power unit may include an IC engine. The frame assembly includes a head tube, a main tube extending rearward from the head tube. The vehicle is provided with a battery-mounting member that is adapted to support battery. The traction motor is powered by a one or more battery mounted to the vehicle.

[00018] In an embodiment, the vehicle comprises a utility space that is provided below a seat assembly, which is disposed rearward to a handle bar assembly. Further, the vehicle comprises a battery-mounting member that is

mounted to the head tube of the vehicle. The battery-mounting member is adapted to support one or more battery of the vehicle.

[00019] In an embodiment, the battery-mounting member comprises a base portion and one or more mounting portion(s). The battery-mounting member is secured to the head tube through the base portion. Further, the mounting portion(s) are extending forwardly from the base portion and extend inclinedly to provide sufficient clearance between batteries required in a mounted condition. In one embodiment, the base portion, the mounting portion(s) are integrally formed.

[00020] In an embodiment, the first mounting portion of the battery-mounting member is provided with one or more battery holder(s) and the second mounting portion is provided with one or more battery holder(s). The battery holder(s) are secured to the battery-mounting member. The battery is provided with mounting slot(s) that are adapted to work in conjunction with the battery holder(s). Further, the battery holder(s) may include an insulating portion that insulates the battery from the frame assembly.

[00021] The battery can be mounted to the battery-mounting member in one or more directions. In an embodiment, the battery is slidably mounted to the battery-mounting member along a lateral direction of the vehicle. In one embodiment, the battery is mounted to the battery-mounting member along a vertical direction.

[00022] The battery-mounting member is provided with one or more support bracket(s) that are secured to battery-mounting member. An impact-absorbing bracket, which is an impact-absorbing bracket, of the one or more support bracket(s) covers at least a portion of the battery thereby acting as a crash guard. Hereinafter, the terms impact-absorbing bracket and the impact-absorbing bracket are interchangeably used. Further, the impact-absorbing bracket restricts impact from reaching the battery. Further, dampers provided on the impact-absorbing bracket dampen any impact from reaching the batteries. Further, the

impact-absorbing bracket is adapted to hold a front panel of the vehicle that covers the battery in at least three directions.

[00023] In an embodiment, component-mounting bracket, which component-mounting bracket, of the one or more support brackets is provided that is adapted to mount at least one electrical/electronic component. In a preferred embodiment, the electrical/electronic mounted works in conjunction with the battery and requires proximal connection with the battery. Hereinafter, the terms component-mounting bracket and component-mounting bracket are interchangeably used.

[00024] In an embodiment, the base member, the mounting portion(s) are integrally formed as the battery-mounting member. The support bracket(s) are secured to the battery-mounting member.

[00025] In another embodiment, the support brackets are integrated with the battery-mounting member.

[00026] Furthermore, in an additional embodiment, the front panel of the vehicle is provided with cooling vent(s) that enable cooling of the vehicle naturally thereby resulting in affective functioning of the battery. Moreover, a charging point is provided on the leg shield of the vehicle, wherein the charging point is in proximity to the battery.

[00027] The present subject matter is applicable to vehicles having a step-through type frame assembly incorporating a traction motor, which is an electric mode vehicle and also to hybrid vehicles incorporating a traction motor and an IC engine.

[00028] Further, the impact absorbing bracket having thickness substantially lesser than thickness of said battery mounting-member. In another embodiment, the impact absorbing bracket having cross sectional area substantially lesser than cross sectional area of said battery mounting-member. The impact absorbing bracket acts as impact bearing member upon impact thereby reducing said impact from reaching the battery mounting-member. Also, the impact-absorbing bracket can be easily replaced.

[00029] The aforesaid and other advantages of the present subject matter would be described in greater detail in conjunction with the figures in the following description.

[00030] Arrows provided in the top right corner of each figure depicts direction with respect to the vehicle, wherein an arrow **F** denotes front direction, an arrow **R** indicated rear direction, an arrow **Up** denotes upward direction, an arrow **Dw** denoted downward direction, an arrow **RH** denotes right side, and an arrow **LH** denoted left side, as and where applicable.

[00031] **Fig. 1** illustrates a left side view of an exemplary hybrid vehicle **100**, in accordance with an embodiment of the present subject matter. The vehicle **100** illustrated, has a frame assembly **105**. The frame assembly **105** includes a head tube **105A**, a main tube **105B**. One or more suspensions **110A** connect a front wheel **110B**, and a handlebar assembly **110C**, forming a steering assembly **110**. The steering assembly **110** is rotatably connected through the head tube **105A**. The main tube **105B** is connected to the head tube **105A** and is extending rearwardly downward from the head tube **105A**. Further, one or more rear tubes **105C** extend inclinedly rearward from a rear portion of the main tube **105B** towards a rear portion of the vehicle **100**. An internal combustion (IC) engine assembly **115** and a traction motor **120**, for example a brush less direct current (BLDC) traction motor **120**, are coupled to a rear wheel **125** through a transmission assembly (not shown). In a preferred embodiment, the traction motor **120** is hub mounted on the rear wheel **125** and the IC engine **115** is mounted to a swing arm **130**, which is swingably connected to the main tube **105B** using a toggle link. In another embodiment, the traction motor is disposed adjacent to the IC engine. An on-board battery **170A**, **170B** (shown in **Fig. 2 (b)**) drives the traction motor **120**. Further, the frame assembly **105** is covered by plurality of body panels including a front panel **135A**, a leg shield **135B**, an under-seat cover **135C**, and a left and a right side panel **135D**, mounted on the frame assembly **105** and covering the frame assembly **105** and parts mounted thereof.

[00032] A front fender **140** is covering the front wheel **110A**. In the present embodiment, the front fender **140** is integrally formed with the front panel **135A**. A floorboard **145** is provided at a step-through space defined by the frame assembly **105** and mounted to the main tube **105B**. A seat assembly **150** is mounted to the rear tubes **105C** and is hinged to the frame assembly **105**. A utility box (not shown) is disposed below the seat assembly **150** and is supported by the rear tubes **105C** and the utility box is accessible in an open condition of the seat assembly **150**. A fuel tank (not shown) is positioned below the utility box. A rear fender **155** is covering at least a portion of the rear wheel **125** and is positioned below the fuel tank and upwardly of the rear wheel **125**. One or more suspension(s) **160** are provided in the rear portion of the vehicle **100** for connecting the swing arm **130** to the mainframe **105B** thereby providing comfortable ride. The vehicle **100** comprises of plurality of electrical and electronic components including a headlight **165A**, a tail light **165B**, a transistor controlled ignition (TCI) unit (not shown), an alternator (not shown), a starter motor (not shown). Further, the vehicle **100** is provided with a battery-mounting member **200**.

[00033] Fig. 2 (a) illustrates a left side perspective view of the frame assembly **105**, in accordance with an embodiment of the subject matter. The frame assembly **105** of the vehicle has a head tube **105A** that is having a tubular structure, which can be circular or any other regular or irregular geometric shape. The main tube **105** extends downwardly rearward from a rear portion of the head tube **105A**. The main tube **105B** includes a tubular shape and the said a front portion of the main tube **105B** is secured to the head tube **105A**. For example, the main tube **105B** is welded to the head tube **105A**. At least one gusset(s) **105D** is provided that secures the head tube **105A** and the main tube **105B** and provides reinforcement.

[00034] The frame assembly **105** is provided with a battery-mounting member **200** that is secured to the frame assembly **105**. Specifically, the battery-mounting member **200** is secured to the head tube **105A** at a front facing

portion of the head tube **105A**. The battery-mounting member **200** comprises a base portion **205** and one or more mounting portion(s) **210A**, **210B**.

[00035] Fig 2 (b) illustrates a right side perspective view of the frame assembly employed with the battery-mounting member in accordance with the embodiment depicted in Fig. 2 (a). The head tube **105A** is having a tubular shape that is having a circular cross-section. A steering shaft (not shown) is disposed rotatably about the head tube **105A**. The head tube **105A** is made of a rigid material including any known metal. The main tube **105B** is having tubular shape with circular cross-section and is secured to the head tube **105A** by welding. Further, the at least one gusset(s) **105D** is made of metal and is welded to the head tube **105A** and the main tube **105B**, thereon.

[00036] The battery-mounting member **200** is secured to the head tube **105A** through the base portion **205**. Further, the battery-mounting member **200** comprises a first mounting portion **210A** and a second mounting portion **210B**. The mounting portion(s) **210A**, **210B** are extending forwardly from the base portion **205** and extend inclinedly to provide sufficient clearance between batteries **170A**, **170B** that are mounted to the vehicle **100**. The battery-mounting member is made of rigid material, preferably of any known metal of sheet. Thickness of the sheet metal is preferred in accordance with weight of the battery. In a preferred embodiment, the base portion **205**, the first mounting portion **210A**, and the second mounting portion **210B** are integrally formed.

[00037] The first mounting portion **210A** of the battery-mounting member **200** is provided with one or more battery holder(s) **215A** and the second mounting portion **210B** is provided with one or more battery holder(s) **215B**. In the present embodiment, the battery holder(s) **215A**, **215B** are T-clamps **215A**, **215B**. The T-clamp(s) are secured to the battery-mounting member **200**. The T-clamp(s) are secured through fasteners or by welding.

[00038] The present embodiment depicts a first battery **170A** and a second battery **170B** that are extending substantially along a lateral direction of the vehicle. The first battery **170A** comprises a mounting slot(s) **170AA** that is

provided on a side of the first battery **170A** facing the battery mounting member **200**. Similarly, a mounting slot(s) **170BA** are provided on the second battery **170B**.

[00039] The mounting slot(s) **170AA**, **170BA** are adapted to work in conjunction with the battery holder(s) **215A**, **215B**, which are T-clamps **215A**, **215B** that enable mounting of the battery **170A**, **170B** slidably to the battery-mounting member **200** along the lateral direction of the vehicle **100**. Further, the battery-mounting member **200** is provided with one or more support bracket(s) **220**.

[00040] However, in another embodiment (not shown), the battery **170A**, **170B** can be mounted from a top portion, wherein the mounting slot(s) are provided on the side of the battery **170A**, **170B** facing the battery-mounting member and are extending substantially along a vertical line.

[00041] Fig. 2 (c) illustrates a left side view of a front portion of the frame assembly employed with battery in accordance with the embodiment depicted in Fig. 2 (b). The Fig. 2 (c) depicts an enlarged view of a portion of the battery-mounting member **200** and the battery **170A** in a mounted condition. The T-clamps **215A** engage with the mounting slot(s) **170AA** of the battery **170A**. In a preferred embodiment, the T-clamps **215A** are engagingly coupled with the mounting slot(s) **170AA**, thereby enabling secure mounting.

[00042] The battery-mounting member **200** further comprises an impact-absorbing bracket **220** that is connected to one end, which is the second mounting portion in the present embodiment, of the battery-mounting member **200**. The impact absorbing bracket **220** extends forward and downwardly of the second battery **170B** and extends forwardly of the second battery **170B** covering at least a portion of the second battery **170B**. The impact-absorbing bracket **220** is made of a rigid material and is secured to the battery-mounting member **200** by fasteners **225**.

[00043] The impact-absorbing bracket **220** covers the bottom portion and at least a portion of front facing side(s) of the battery **170A**, **170B**. In addition, the impact-absorbing bracket **220** comprises panel-mounting portion (not shown) that is adapted to mount the front panel **135A** to the battery-mounting member **200**. The front panel **135A** covers the battery **170A**, **170B** thereby securing the battery from atmosphere and from dust, water, or dirt. Further, the impact absorbing bracket **220** acts crash guard that restricts impact from reaching the battery **170A**, **170B**. Further, the impact absorbing bracket **220** is having a cross sectional area substantially lesser than the cross sectional area of the battery mounting-member **200**, whereby said impact absorbing bracket **220** acts as impact bearing member upon impact. Moreover, the impact-absorbing bracket **220** is easily replaceable. Also, the first support member is provided with panel mounting portions **220A** that enable in securing the front panel **135A** to the frame assembly **105**. Also, a locking system is provided to securely access the batteries, wherein the locking system secures the front panel **135A** to the frame assembly **105**, thereby avoiding any unauthorized access to the batteries **170A**, **170B**.

[00044] Also, the base portion **205** is secured to an mid-portion along axial length of the head tube **105A**, wherein the mounting portion(s) **210A**, **210B** are supporting the batteries **170A**, **170B** are disposed on either sides **Up**, **Dw** of the base portion **205** for balanced weight distribution.

[00045] Furthermore, a cushioning material or damping material can be provided on the impact-absorbing bracket **200** that enables damping of impact. Further, an insulating material is provided about the battery **170A**, **170B** that eliminates any false contacts.

[00046] **Fig. 3 (a)** depicts a left side view of the frame assembly, in accordance with another embodiment of the present subject matter. The battery-mounting member comprises a component-mounting bracket **235** that is mounted to another end of the battery-mounting member **300**. In a preferred embodiment, the component-mounting bracket **235** is extending from the top portion of the battery-mounting member **300** and extending upwardly of the battery **170A** (not

shown). The component-mounting bracket **235** is adapted to mount at least one electrical/electronic component. In a preferred embodiment, the electrical/electronic component working in conjunction with the battery is disposed in proximity and supported by the second support member **235**. The second support member is made of a rigid material including synthetic or metal.

[00047] Further, the base portion **205** is disposed substantially inward and the first mounting portion **210A** and the second mounting portion **210B** are disposed away from the base portion. Also, the mounting portion(s) **210A**, **210B** are spaced apart either vertically, horizontally, or at an angle to provide clearance between batteries **170A**, **170B** in mounted condition.

[00048] Fig. 3 (b) depicts a left side perspective view of the front portion of the frame assembly employed with the battery-mounting member and parts mounted thereon. The battery-mounting member **300** is mounted with the first battery **170A** and the second battery **170B**. Further, a fuse box **180** is mounted to the second support member **235**. The fuse box **180** is an electrical device. However, the term electrical is not limiting to electrical components, but also includes electronic components that work in conjunction with the battery. The pair of front fork(s) **110A** is connected through a lower bracket **110D**. In an embodiment, the battery **170A**, **170B** are disposed upwardly of the lower bracket **110D** thereby eliminating any interference between the battery **170B** and the lower bracket **110D**.

[00049] The battery **170A**, **170B** is functionally connected to the traction motor, which is disposed in the rear portion of the vehicle, through a wiring harness (not shown) capable of carrying high current. Therefore, a fuse box **180** is mounted to the component-mounting bracket **235** and is functionally connected to the battery **170A**, **170B** and disposed in proximity to the battery **170A**, **170B**. Through the fuse box **180** the battery **170A**, **170B** is coupled to the loads including a control unit (not shown), the traction motor **120**, and direct current load(s).

[00050] In case of any malfunction or short circuit, the fuse box **235** blows and isolates the battery **170A**, **170B** from other components that are functionally connected to the battery **170A**, **170B**.

[00051] Furthermore, in an additional embodiment, the front panel **135A** (as shown in **Fig. 1**) of the vehicle **100** is provided with cooling vent(s) (not shown) that enable cooling of the vehicle naturally thereby resulting in effective functioning of the battery **170A**, **170B**. Moreover, a charging point (not shown) is provided on the leg shield **135B** of the vehicle **100**, wherein the charging point is in proximity to the battery **170A**, **170B** thereby reducing copper losses, and saving cost due to short wiring lengths.

[00052] In one embodiment, the vents are extending vertically and are disposed at an inclination. The inclinedly disposed vent enables entry of air and reduces entry of water through the front panel.

[00053] It is an advantage that the frame assembly **105** of the vehicle **100** provided with battery-mounting member **200**, **300** provides a compact battery mounting structure. The battery-mounting member **200**, **300** is provided on the head tube **105A** with minimal affixing portion. This enables in retaining the structural rigidity of the head tube **105A** that is one of the loads receiving points of the frame assembly **105**. Also, the base member **205** and the arms **210A**, **210B** are integrally formed to provide rigid structure. Further, the battery-mounting member **200**, **300** eliminates any limitation of mounting the battery thereof. It is also another advantage that the battery-mounting member **200** includes an impact-absorbing bracket **220** that is capable of covering the batteries **170A**, **170B** in one more directions. The impact-absorbing bracket **220** is provided with thickness substantially less than the base member **205**, whereby upon impact the impact-absorbing bracket **220** acts as impact receiving portion and enables easy replacement of the first support member.

[00054] Also, the auxiliary power sources, which are batteries, are directly mounted to the battery support member **200**, **300**. Therefore, the need for additional casing, additional enclosing structures, or the like is eliminated. Thus,

the present subject matter provides compact battery mounting structure that can be accommodated in the compact vehicles like two-wheelers. Also, the battery-mounting member being affixed to the head tube of the frame assembly provides rigid structure to support the high capacity batteries. Also, the weight of the batteries is supported by the frame assembly, which is the load bearing and structural member of the vehicle.

[00055] It is to be understood that the aspects of the embodiments are not necessarily limited to the features described herein. Many modifications and variations of the present subject matter are possible in the light of above disclosure. Therefore, within the scope of claims of the present subject matter, the present disclosure may be practiced other than as specifically described.

I/We claim:

1. A two-wheeled vehicle (100) comprising:

a frame assembly (105) including a head tube (105A) and a main tube (105B) extending rearward from a rear portion of said head tube (105A);

a traction motor (120) functionally coupled to at least one wheel (125) of said vehicle (100); and

one or more auxiliary power source(s) (170A, 170B) operatively connected to said traction motor (120),

wherein

the frame assembly (105) further comprises a battery-mounting member (200, 300) comprising a base portion (205) and one or more mounting portion(s) (210A, 210B) connected thereto, said battery-mounting member (200, 300) being at least partially supported by said head tube (105A) through said base member (205), and said one or more mounting portion(s) (210A, 210B) capable of detachably-supporting said one or more auxiliary power source(s) (170A, 170B).

2. The two-wheeled vehicle (100) of claim 1, wherein said battery-mounting member (200) is affixed to a front facing portion of said head tube (105A).

3. The two-wheeled vehicle (100) of claim 1, wherein the battery-mounting member (200, 300) is provided with a impact absorbing bracket(s) (220), and said impact absorbing bracket(s) (220) covering at least a portion of said auxiliary power source(s) (170A, 170B) from one or more directions (Dw, F).

4. The two-wheeled vehicle (100) of claim 1 or 3, wherein said impact absorbing bracket(s) (220) is adapted to support a front panel (135A) of said vehicle (100) and said front panel (135A) covers at least a portion of said auxiliary power source(s) (170A, 170B).

5. The two-wheeled vehicle (100) of claim 1 or 3, wherein said impact absorbing bracket(s) (220) is having thickness substantially lesser than thickness of said base member (205), whereby said impact absorbing bracket (220) acts as impact bearing member during impact.

6. The two-wheeled vehicle (100) of claim 1, wherein the battery-mounting

member (300) comprises a component-mounting bracket (235) affixed thereof and said component-mounting bracket (235) being adapted to mount at least one electronic component (180) working in conjunction with said auxiliary power source(s) (170A, 170B), whereby said electronic component (180) is disposed in proximity to said auxiliary power source(s) (170A, 170B).

7. The two-wheeled vehicle (100) of claim 1 or 2, wherein said one or more mounting portion(s) (210A, 210B) are provided with T-clamps (215A, 215B) capable of engaging with mounting slot(s) (170AA) provided on said auxiliary power source(s) (170A, 170B), whereby said auxiliary power source(s) (170A, 170B) are slidably mounted to said T-clamp (215A, 215B).

8. The two-wheeled vehicle (100) of claim 1 or 2, wherein said base portion (205) is secured to a mid-portion of an axial-length of said head tube (105A), and said one or more mounting portion(s) (210A, 210B) are extending away from the base portion (205).

9. The two-wheeled vehicle (100) of claim 1 or 2, wherein said base portion (205), and said one or more mounting portion(s) (210A, 210B) are integrally formed.

10. The two-wheeled vehicle (100) of claim 1, wherein said frame assembly (105) swingably supports an internal combustion engine (115) connected thereof, wherein said internal combustion engine (115) is functionally coupled to said at least one wheel (125).

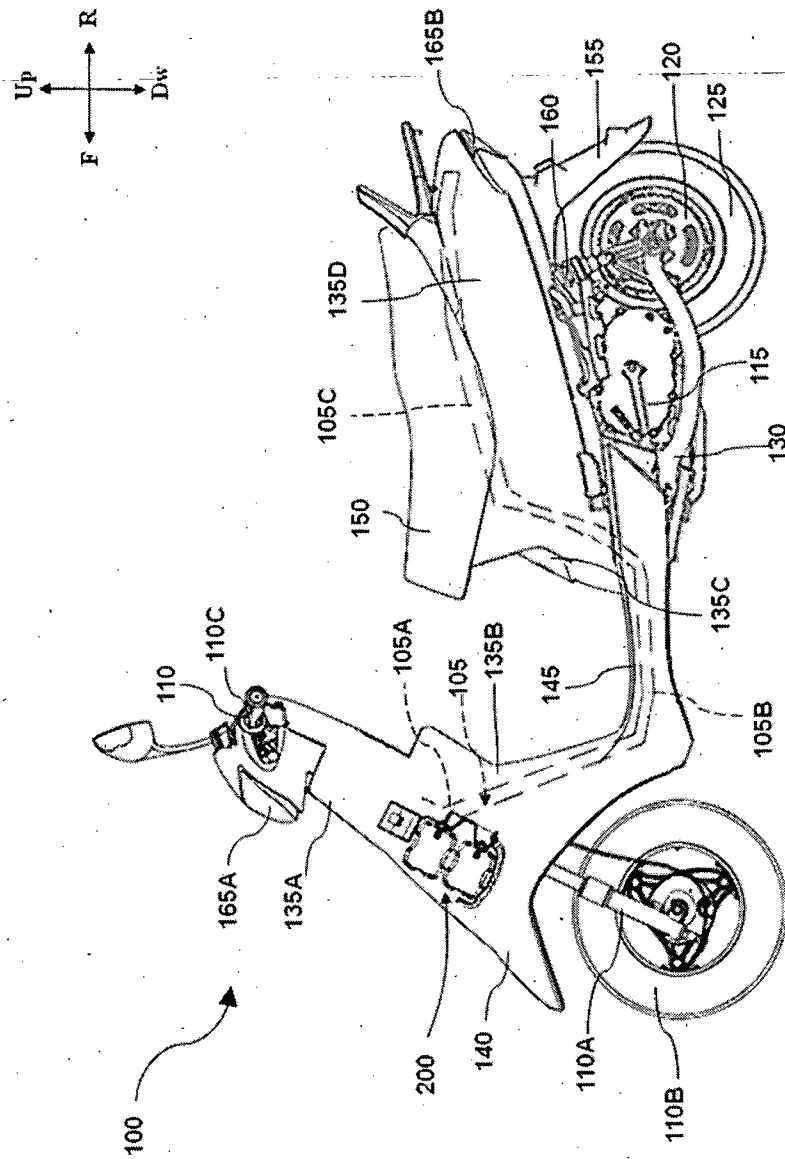
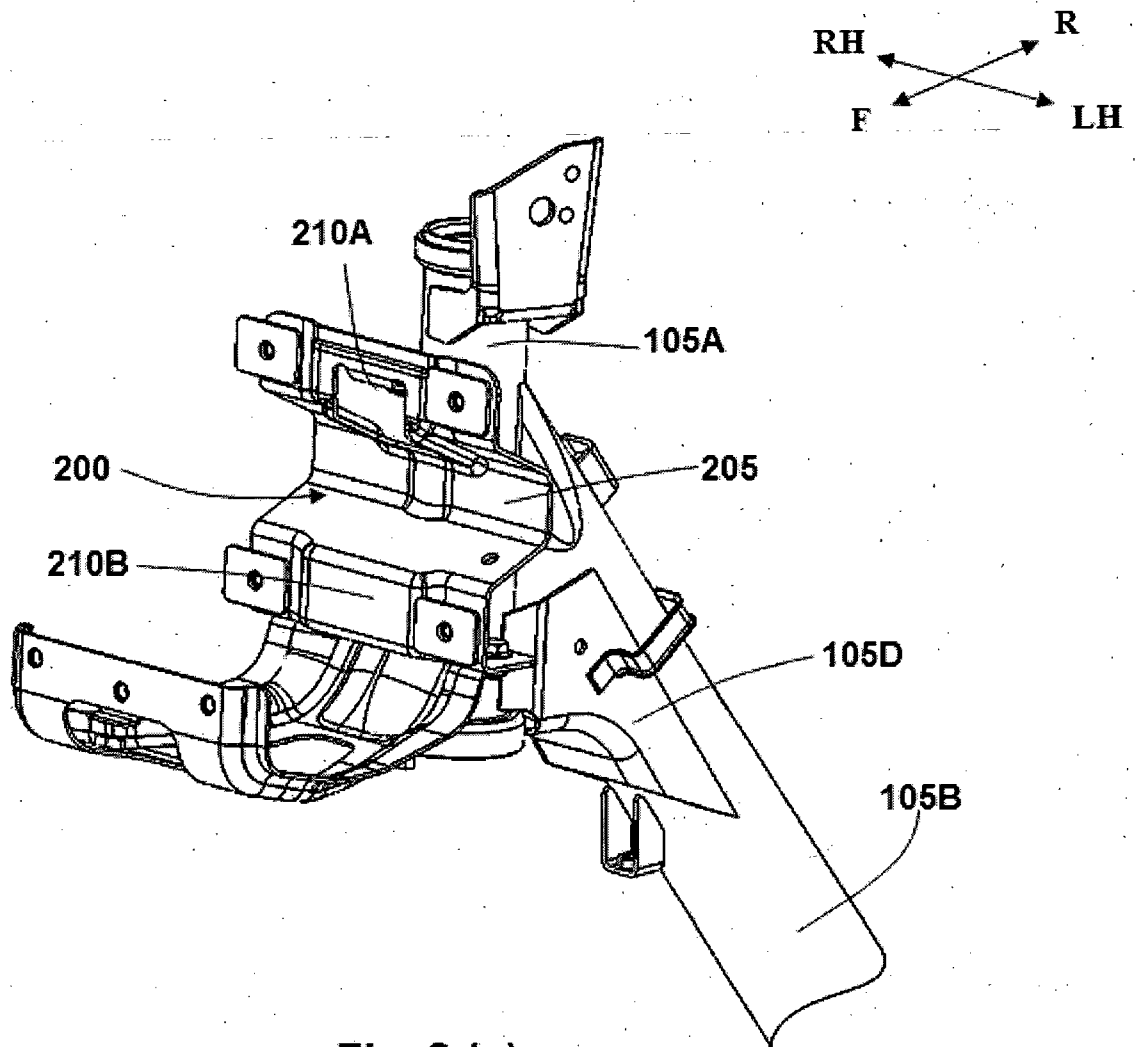


Fig. 1



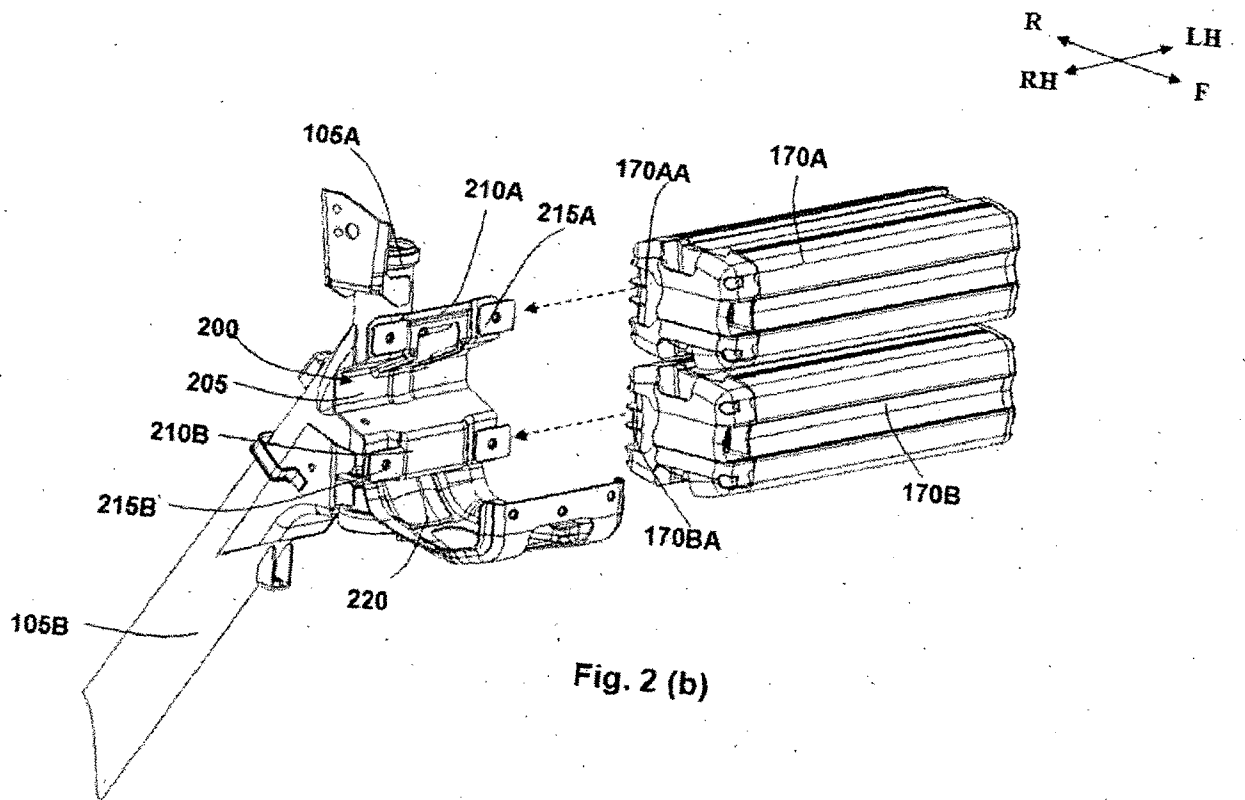


Fig. 2 (b)

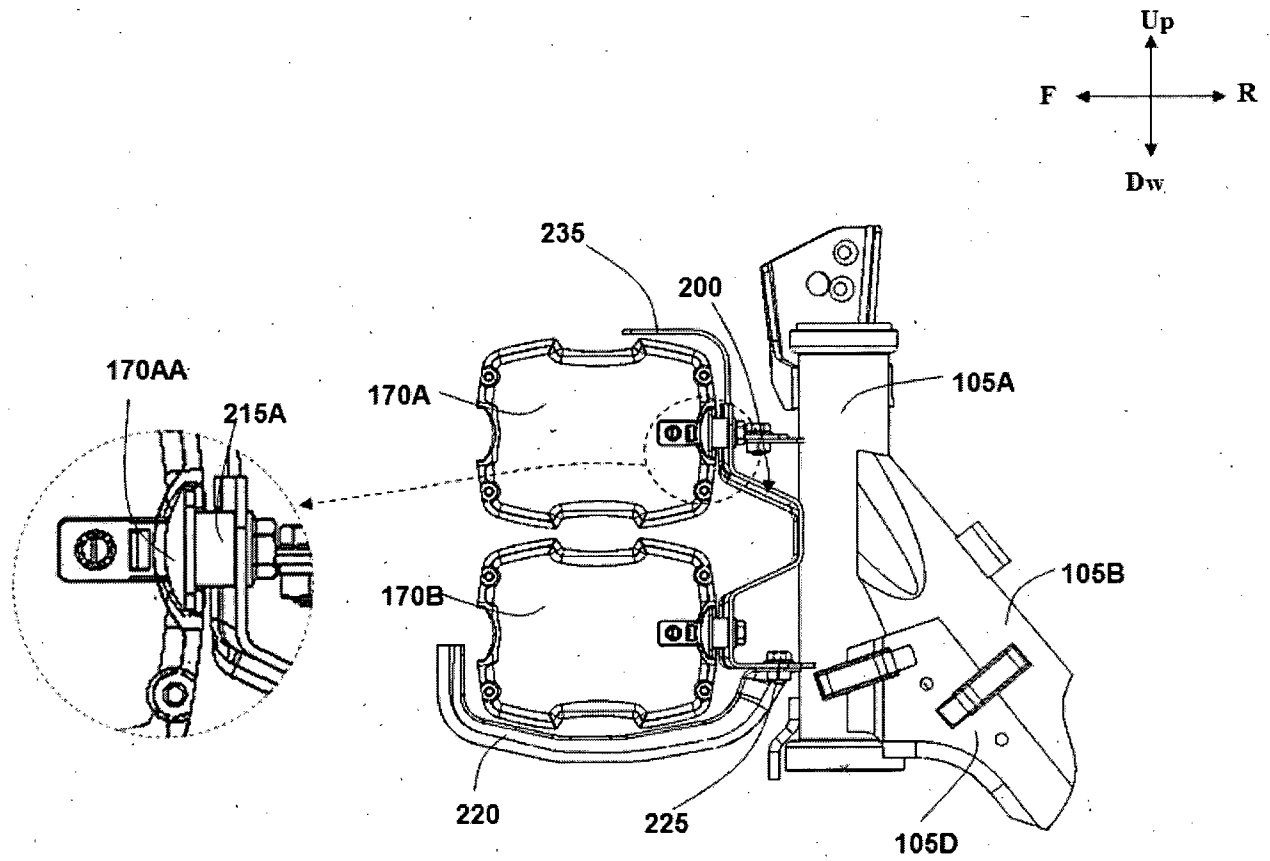


Fig. 2 (c)

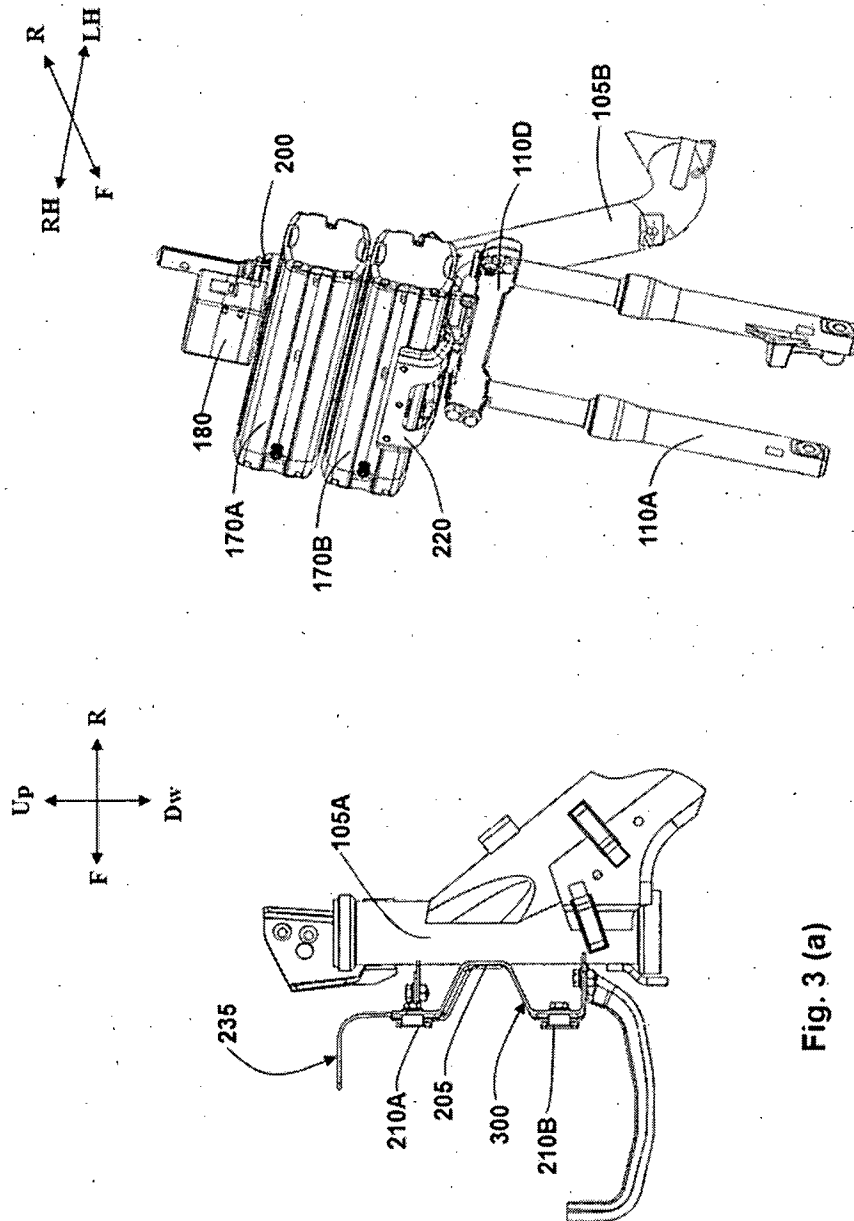


Fig. 3 (a)

Fig. 3 (b)

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2017/000295

A. CLASSIFICATION OF SUBJECT MATTER

INV. B62J11/00 B62M23/02 B62J27/00
 ADD. B62J99/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B62M B62J B62K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	JP 2006 151189 A (HONDA MOTOR CO LTD) 15 June 2006 (2006-06-15) abstract; figures 1,2,5-12 -----	1,3,5,6, 8-10 4 2,7
X A	EP 0 818 835 A2 (HONDA MOTOR CO LTD [JP]) 14 January 1998 (1998-01-14) column 3, line 48 - column 4, line 12 column 5, line 29 - column 7, line 17 column 9, lines 29-48 figures 1,3-7,11,12 -----	1-3,6-9 4,5,10
X A	EP 2 168 861 A1 (HONDA MOTOR CO LTD [JP]) 31 March 2010 (2010-03-31) paragraphs [0018], [0040], [0056] figure 7 ----- -/-	1-3,8,9 4-7,10



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

3 August 2017

Date of mailing of the international search report

11/08/2017

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040,
 Fax: (+31-70) 340-3016

Authorized officer

Truchot, Alexandre

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2017/000295

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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