



- (51) **International Patent Classification:**
B62D 21/02 (2006.01) *B62D 65/02* (2006.01)
- (21) **International Application Number:**
PCT/IB2016/056862
- (22) **International Filing Date:**
15 November 2016 (15.11.2016)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
201641001794 18 January 2016 (18.01.2016) IN
- (71) **Applicant:** **ATHER ENERGY PVT. LTD** [IN/IN]; Ather Energy Pvt. Ltd., No.1, Victoria Road Extension, Victoria Layout, 6th Cross, Karnataka, Bengaluru 560047 (IN).
- (72) **Inventors:** **BISWAS, Bikash Jyoti**; House no. – 23, Kaus-turba Nagar, South Sarania, Ulubari, 781007 Guwahati (IN). **MODY, Mahek**; A1402, Florentine, Hiranandani Gardens, Powai, 400076 Mumbai (IN). **VINAYAK, Arun**; #164, Embassy heritage, 8th main, Malleshwaram, Ban-galore 560055 (IN).
- (74) **Agent:** **SAHNEY, Garima**; Saikrishna & Associates, Ad-vocates, B-140, Sector 51, Uttar Pradesh, Noida 201301 (IN).
- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,

[Continued on next page]

(54) **Title:** MODULAR FRAME STRUCTURE FOR AN AUTOMOTIVE VEHICLE

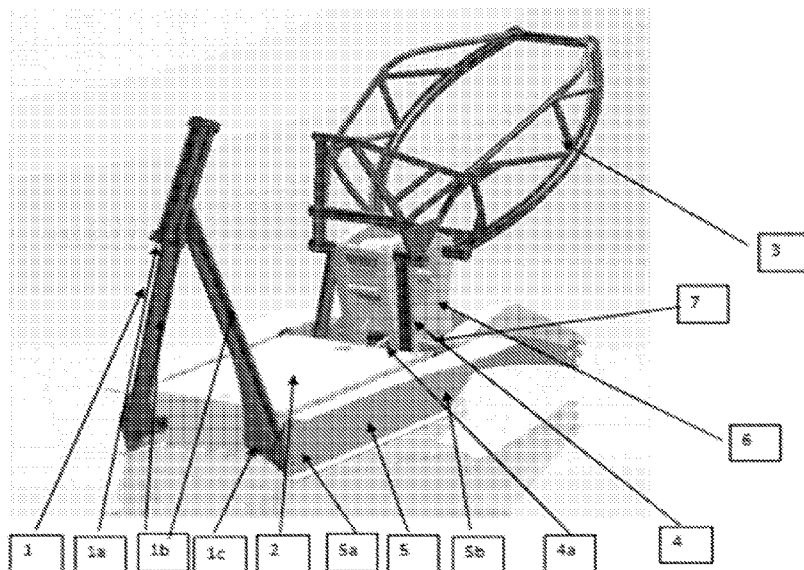


FIGURE 1

(57) **Abstract:** Embodiment of the present invention may relate to a modular frame for automotive vehicle, the modular frame comprising a steering frame [1] for accommodating a front wheel and a steering assembly, a modular mount assembly [6] and at least one channel [5]. Further, the modular mount assembly [6] accommodates an upper frame [3] for supporting at least one seating arrangement, a lower frame [4] for supporting a rear wheel and a vertical rod for connecting the upper frame [3] and the lower frame [4].



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, KM, ML, MR, NE, SN, TD, TG).

— of inventorship (Rule 4.17(iv))

Declarations under Rule 4.17:

Published:

— as to applicant's entitlement to apply for and be granted
a patent (Rule 4.17(ii))

— with international search report (Art. 21(3))

MODULAR FRAME STRUCTURE FOR AN AUTOMOTIVE VEHICLE

FIELD OF THE INVENTION

- 5 The present invention generally relates to vehicle structure and more particularly relates to a modular frame structure for the vehicle.

BACKGROUND OF THE INVENTION

- 10 Generally, frame structures of vehicles have been often seen to be custom designed with a number of components constructed in different shapes. Conventionally manufactured frame structures involve these components, made with MS pipes, are welded together in a single frame fixture in accordance to the desired design and specification of the vehicle which, so far, has been the most
15 cost efficient technique.

- However, the welding of different components of the frame structure, though a conventional technique, suffers several disadvantages. The welding process produces huge amount of heat which leads to expansion and distortion of the
20 components of the frame being welded. Another disadvantage of welded frame structures is that in case of an accident/crash of a vehicle, if a minuscule component gets deformed or destroyed, the whole body frame has to be replaced to ensure that the strength and safety of the vehicle is not compromised with.

- 25 Further, bolted structures used in vehicle have been known in manufacture of trellis frames with bolts on the engine and swing arm together, particularly in high end performance bikes. However, the welded pipe structure still decides to a huge extent the strength of the vehicle. Therefore, there is a need to
30 manufacture a chassis and/or a body frame structure which has replaceable

components without having to compromise on the strength, sturdiness and performance of the vehicle.

Accordingly, there exists need in the art to provide solution to overcome the problems, but not limited to, aforementioned drawbacks/shortcomings associated with the existing frame structures for automotives.

The information disclosed in this section is only for enhancement of understanding of the general background of the invention. The approaches described herein are approaches that could be pursued, but not necessarily approaches that have been previously conceived or pursued. Therefore, unless otherwise indicated, it should not be assumed that any of the approaches described in this section qualify as prior art merely by virtue of their inclusion in this section nor should they be taken as an acknowledgement or any form of suggestion that this information is already known to a person skilled in the art.

OBJECTS OF THE INVENTION

This section is provided to introduce certain objects and aspects of the disclosed methods and systems in a simplified form that are further described below in the detailed description.

It is the primary object of the present invention to provide a modular frame structure which is efficient, structurally sturdy and has reduced tolerance errors with no compromise on the performance of the vehicle.

It is another object of the present invention to facilitate replacable chassis/frame structure members in case of a defect or deformation in an event of a crash or accident.

30

It is yet another object of the present invention to provide for a frame structure which provides for easy assembly and installation as well as convenient repairs.

It is yet another object of the present invention to provide for a frame structure
5 which is cost effective in manufacturing and production.

SUMMARY OF THE INVENTION

In view of the above and other objects, one aspect of the present invention relates to a modular frame for a vehicle, the modular frame comprising: a
10 steering frame [1] for accommodating a steering assembly; a modular mount assembly [6] for accommodating a rear frame, and at least one channel [5] for connecting the steering frame [1] to the rear frame of the modular mount assembly, and combination thereof.

15 BRIEF DESCRIPTION OF THE DRAWING

The accompanying drawings, which are incorporated herein, and constitute a part of this invention, illustrate exemplary embodiments of the disclosed methods and systems in which like reference numerals refer to the same parts
20 throughout the different drawings. Some drawings may indicate the components using block diagrams and may not represent the internal circuitry of each component. It will be appreciated by those skilled in the art that disclosure of such drawings include disclosure of electrical components or circuitry commonly used to implement such components.

25 The preferred embodiments of the present invention can be best understood when read in conjunction with the following drawing:

Figure 1 illustrates a modular arrangement of the body frame structure of a vehicle in an exemplary embodiment of the present invention.

30

It may be evident to skilled artisans that elements in the figure are only illustrative, for simplicity and clarity, and have not necessarily been drawn to scale. For example, the dimensions of some of the elements in the figure may be exaggerated relative to other elements to help to improve understanding of
5 embodiments of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, for the purposes of explanation, various specific
10 details are set forth in order to provide a thorough understanding of the disclosed embodiments. It will be apparent, however, that the disclosed embodiments may be practiced without these specific details. Several features described hereafter can each be used independently of one another or with any combination of other features. However, any individual feature may not address
15 any of the problems discussed above or might address only some of the problems discussed above in the background section. Some of the problems discussed above might not be fully addressed by any of the features described herein. Although headings are provided, information related to a particular heading, but not found in the section having that heading, may also be found
20 elsewhere in the specification. Further, information provided under a particular heading may not necessarily be a part of only the section having that heading.

In the following description, for the purposes of explanation, numerous specific
25 details are set forth in order to provide a thorough understanding of the present invention. It will be apparent, however, that the present invention may be practiced without these specific details. In other instances, well-known structures and devices are shown in line diagram form in order to avoid unnecessarily obscuring the present invention.

30 The invention encompasses a modular arrangement of the body frame structure/ chassis of a vehicle. The chassis components are bolted together and may be

detached and replaced, as and when required. The frame/chassis encompassed herein is sturdy and efficient with no compromise on the accuracy or performance of the vehicle.

- 5 As used herein, a 'vehicle' refers to a mobile machine that transports people or cargo. The vehicle may include, but are not limited to, an electric vehicle, a hybrid vehicle, a conventional vehicle, an alternative fuel vehicle, and any other vehicle having at least a wheel which may be obvious to a person skilled in the art.

10

As illustrated in FIG.1, the present invention relates to a modular frame, wherein the modular frame has a modular arrangement of the body frame structure/chassis of a vehicle is provided which comprises of, but not limited to, a steering frame [1] for accommodating a steering assembly; a modular mount assembly
15 [6] for accommodating a rear frame and at least one channel [5] for connecting the steering frame [1] to the rear frame of the modular mount assembly and combination thereof.

- The steering frame [1] of the vehicle accommodates a front wheel and a steering
20 assembly. The steering frame [1] further comprises a steering sleeve [1a] joined and/or detachably coupled to at least one of a first frontal member [1b] or a second frontal member [1c]. The at least first frontal member [1b] or a second frontal member [1c] comprises of a mounting member that facilitates the mounting of at the least first frontal structure [1b] or second frontal structure
25 [1c] to the at least one channels [5]. The steering assembly as used herein may comprise of a front wheel, a fork, a bracket, a steering column, a suspension system, a brake, a front vehicle mount and combination thereof.

- Further, embodiments of the present invention encompasses the at least one
30 channel [5] being connected to the at least one first and/or second frontal structure at one end [5a]. The present invention also encompasses the at least

one channel [5] being connected to the one rear frame having a lower frame [4],
a upper frame [3] and combination thereof. Moreover, the upper frame [3] is
provided to support at least one seating arrangement whereas the lower frame
[4] is provided to support a rear wheel. The at least one channel [5] extending
5 rearwards has a vertical member to accommodate a stepped up footboard.

Further, with reference to the FIG.1 of the present invention, the lower frame [4]
may be detachably mounted on the modular mount assembly [6]. In this
particular embodiment, the lower frame [4] extends rearwards towards the
10 modular mount assembly [6] such that a rearward extended member [4a]
further extends laterally and horizontally supporting an axle [7]. In one
embodiment of the present invention, the modular mount assembly [6] of the
present invention is configured to adapt a motor/prime mover.

15 In another embodiment of the present invention, the upper frame [3] may be
detachably coupled/mounted on the modular mount assembly [6] and the lower
frame [4]. Further, in an alternative embodiment, a bushing member may be
placed between one of the at least one channel [5], the steering frame [1],
modular mount assembly [6], the upper frame [3], the lower frame [4] and
20 combination thereof. Further, with respect to the present invention, the upper
frame [3] and the lower frame [4] may be connected using a vertical rod and may
be detachably coupled/mounted on modular mount assembly [6].

The modular mount assembly [6] houses a motor at an one end and the axle [7]
25 at an another end. Further, in accordance with the present invention, the at least
one channel [5] is connected to the modular mount assembly [6] through the
axle [7].

Furthermore, the connection/coupling between the steering frame [1], the
30 modular mount assembly [6], the at least one channel [5] and any combination

thereof may be arranged in a detachable manner for providing modularity to the structure.

5 The mounts and components that characterize the invention, as illustrated hereinabove, are bolted to each other, either partially or fully, depending upon the design, structure and strength desired. In an embodiment where the bolts are partially used, the remaining components are typically welded employing conventionally known techniques. Alternatively, in yet another embodiment all the components of the chassis are bolted.

10

Although the present invention has been described in considerable detail with reference to certain preferred embodiments and examples thereof, other embodiments and equivalents are possible. Even though numerous characteristics and advantages of the present invention have been set forth in 15 the foregoing description, together with functional and procedural details, the disclosure is illustrative only, and changes may be made in detail, especially in terms of the procedural steps within the principles of the invention to the full extent indicated by the broad general meaning of the terms. Thus, various modifications are possible of the presently disclosed system and process without 20 deviating from the intended scope and spirit of the present invention. Accordingly, in one embodiment, such modifications of the presently disclosed system and method are included in the scope of the present invention.

1. A modular frame for a vehicle, the modular frame comprising:
 - a steering frame [1] for accommodating a steering assembly;
 - a modular mount assembly [6] for accommodating a rear frame, and
 - 5 - at least one channel [5] for connecting the steering frame [1] to the rear frame of the modular mount assembly, and combination thereof.
- 10 2. The modular frame as claimed in the claim 1, wherein the steering assembly includes at least one of a front wheel, fork, a bracket, a steering column, a suspension system, a brake, a front vehicle component mount and combination thereof.
- 15 3. The modular frame as claimed in the claim 1, wherein the steering frame [1] is detachably coupled to the at least one channel [5].
- 20 4. The modular frame as claimed in the claim 1, wherein the rear frame comprising one of an upper frame [3], a lower frame [4] and combination thereof.
- 25 5. The modular frame as claimed in the claim 1, wherein the upper frame [3] is provided to support at least one seating arrangement, and the lower frame [4] to support a rear wheel.
- 30 6. The modular frame as claimed in the claim 1, wherein the upper frame [3], a lower frame and combination thereof are detachably connected to the modular mount assembly [6].
7. The modular frame as claimed in the claim 1, wherein the at least one channel [5] is mounted on the lower frame.

8. The modular frame as claimed in the claim 1, wherein the at least one channel [5] is detachably connected to the modular mount assembly [6] through an axle [7].
- 5 9. The modular frame as claimed in the claim 1, wherein one of the steering frame [1], the modular mount assembly [6], the at least one channel [5], and combination thereof are detachably coupled to each other.
- 10 10. The modular frame as claimed in the claim 1, further includes a bushing member placed between one of the at least one channel [5], the steering frame [1], the modular mount assembly [6], the upper frame, the lower frame, and combination thereof.

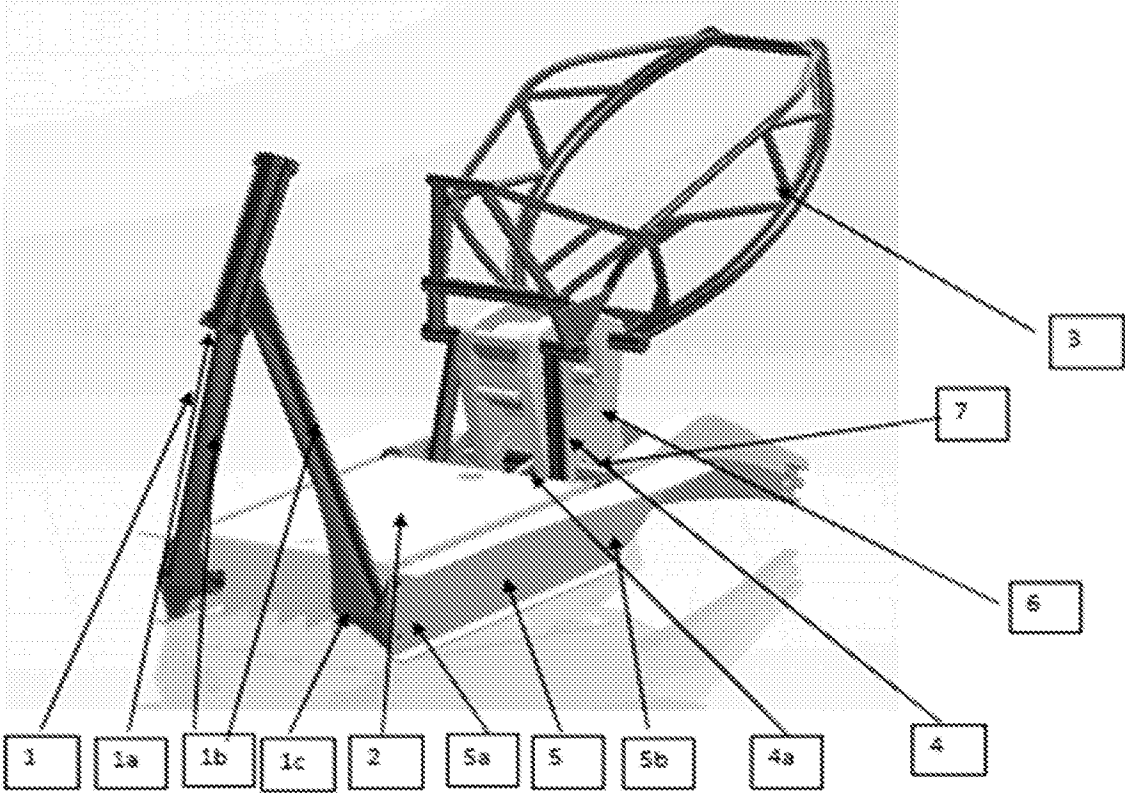


FIGURE 1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2016/056862

A. CLASSIFICATION OF SUBJECT MATTER
B62D21/02, B62D65/02 Version=2017.01

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)

B62D

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)

Patseer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO2009094695 A1 (EZYRIDER RECREATIONAL VEHICLES, MATTHEWS Anthony Mark) 06 August 2009 (06.08.2009) Page 12; line 29-33, Page 13; line 12-20, Figure 1	1-5, 7
A	Page 12; line 29-33, Page 13; line 12-20, Figure 1 -----	6, 8-10
A	US2015250666 A1 (INVACARE INTERNATIONAL SARL) 10 September 2015 (10.09.2015) Para [0029]	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search

07-02-2017

Date of mailing of the international search report

07-02-2017

Name and mailing address of the ISA/

Indian Patent Office
Plot No.32, Sector 14, Dwarka, New Delhi-110075
Facsimile No.

Authorized officer

Seetha Raman A

Telephone No. +91-1125300200

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2016/056862

Citation	Pub.Date	Family	Pub.Date
US 2015250666 A1	10-09-2015	AU 2012395506 A1	09-07-2015
		CA 2889555 A1	05-06-2014
		EP 2925593 A1	07-10-2015
		WO 2014083388 A1	05-06-2014