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(54) Title: A SADDLE TYPE VEHICLE

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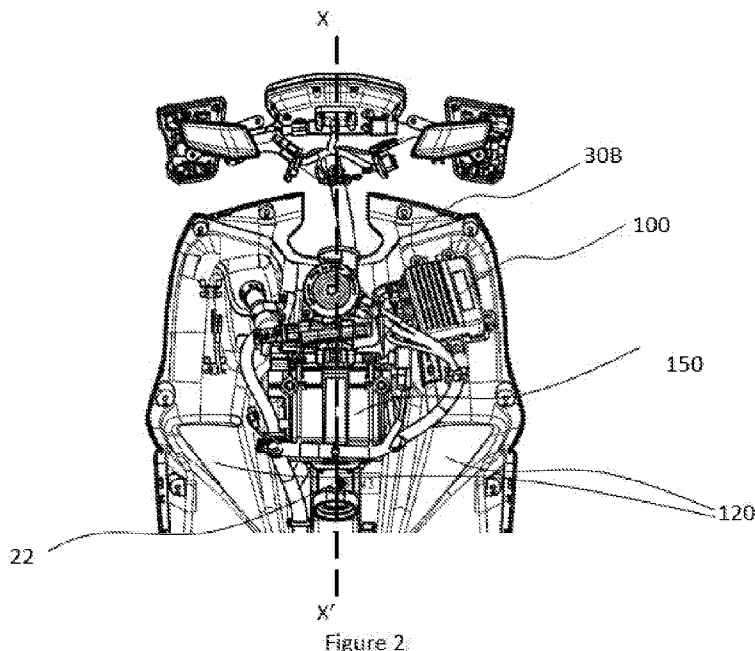


Figure 2

(57) Abstract: The present invention relates to a saddle type vehicle (10). The saddle type vehicle (10) has a head pipe (22) and a main frame extending downwardly and rearwardly from the head pipe (22). Further, a rear panel (30B) extends in a vehicle up down direction. The rear panel (30B) extends along the head pipe (22) and the main frame. The saddle type vehicle (10) further has a control unit (100) supported on the rear panel (30B). The control unit (100) is disposed forwardly of the head pipe (22) and is disposed offset from a vehicle centreline (X-X') in a vehicle width direction.



RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

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TITLE OF INVENTION**A Saddle Type Vehicle****FIELD OF THE INVENTION**

[001] The present invention relates to a saddle type vehicle. More particularly, the present invention relates to disposition of a control unit in a saddle type
5 vehicle.

BACKGROUND OF THE INVENTION

[002] Conventional saddle type vehicles are equipped with several controllers that control different vehicle components and different vehicle systems. For
10 instance, an ISG controller controls the Integrated Starter Generator (ISG) machine of the vehicle. Especially in case of controllers that perform more than one operation, such as controlling an ISG and acting as a controller for the functionality of hybrid assist, the controller is susceptible to high surface temperatures during their operation. Since the controller has multiple active
15 components such as transistors and MOSFETs, adequate airflow needs to be provided to the surface of the controller to obtain adequate heat dissipation. Especially in the case of ISG controllers and hybrid assist integrated controllers, if both are packaged in a tight packaging near the engine cooling

due to space constraints, adequate cooling is not obtained which can result in failure of controller.

[003] In other conventional saddle type vehicles, the engine control unit which is configured to control the engine is disposed in front of the head pipe. More particularly, the engine control unit is packaged in the inner space of the head pipe storage portion which overlaps at least part of the head pipe. When a large sized engine control unit is disposed around the head pipe, it severely restricts the layout and packaging of the other components and deteriorates maintenance performance of the other components.

10 [004] In other conventional saddle type vehicles, the engine control unit is disposed on one of right and left sides of a vehicle centreline in a vehicle width direction in a rear storage space which is formed in front of the lower portion and behind the bottom cover. This particular location is not feasible in terms of servicing and accessing the engine control unit.

15 [005] Thus, there is a need in the art for a saddle type vehicle which addresses the aforementioned problems.

SUMMARY OF THE INVENTION

[006] In an aspect, the present invention is directed towards a saddle type vehicle. The saddle type vehicle has a head pipe and a main frame extending downwardly and rearwardly from the head pipe. Further, a rear panel extends

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in a vehicle up down direction. The rear panel extends along the head pipe and the main frame. The saddle type vehicle further has a control unit supported on the rear panel. The control unit is disposed forwardly of the head pipe and is disposed offset from a vehicle centerline in a vehicle width direction.

5 [007] In an embodiment of the invention, the control unit is an integrated controlled configured to control and an Integrated Starter Generator and a hybrid assist functionality of the saddle type vehicle.

[008] In a further embodiment of the invention, the control unit is disposed offset to a left side from the vehicle centreline in a vehicle rear view. In an
10 alternative embodiment of the invention, the control unit is disposed offset to a right side from the vehicle centerline in a vehicle rear view.

[009] In a further embodiment of the invention, the saddle type vehicle has a front style panel extending in a vehicle up down direction abutting the rear panel. The front style panel and the rear panel define a space therebetween.
15 The control unit is disposed in the space defined between the front style panel and the rear panel.

[010] In a further embodiment of the invention, a pair of slots are provided between the front style panel and the rear panel to accommodate a pair of suspension members for a front wheel. The pair of slots are in fluid
20 communication with the space defined between the front style panel and the

rear panel, such that air entering the pair of slots is passed on to the space defined between the front style panel and the rear panel.

[011] In a further embodiment of the invention, the saddle type vehicle has a first bracket configured to be mounted on the rear panel, and a second bracket
5 configured to receive the control unit. The second bracket is attached to the first bracket, thereby supporting the control unit on the rear panel.

[012] In a further embodiment of the invention, a battery for powering at least an Integrated Starter Generator and the control unit, the battery being mounted forwardly of the head pipe.

10 [013] In a further embodiment of the invention, the control unit is disposed rearwardly of the battery in a vehicle side view.

BRIEF DESCRIPTION OF THE DRAWINGS

[014] Reference will be made to embodiments of the invention, examples of
15 which may be illustrated in accompanying figures. These figures are intended to be illustrative, not limiting. Although the invention is generally described in context of these embodiments, it should be understood that it is not intended to limit the scope of the invention to these particular embodiments.

Figure 1 illustrates a left side view of an exemplary saddle type vehicle,
20 in accordance with an embodiment of the invention.

Figure 2 illustrates a front view of the saddle type vehicle, in accordance with an embodiment of the invention.

Figure 3 illustrates a left side view of a control unit on the saddle type vehicle, in accordance with an embodiment of the invention.

5 Figure 4 illustrates a magnified left side view of the control unit on the saddle type vehicle, in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[015] The present invention relates to a saddle type vehicle. More particularly,
10 the present invention relates to disposition of a control unit on a saddle type vehicle.

[016] Figure 1 illustrates a left-side view of an exemplary saddle type vehicle 10, in accordance with an embodiment of the present subject matter. The vehicle 10 comprises a frame. The frame comprises a head pipe 22 (shown in
15 Figure 2), and a main frame (not shown), which extends rearwardly and downwardly from the head pipe 22 to a floorboard 18. One or more front suspensions 44 connect a front wheel 14 to a handlebar 20, which forms a steering assembly of the vehicle 10. The steering assembly is rotatably disposed about the head pipe 22. The main frame further includes a portion
20 extending horizontally and rearwardly in a vehicle front rear direction. Further,

the frame includes a left side frame and a right side frame extending inclinedly rearward towards a rear portion of the vehicle 10.

[017] The vehicle 10 includes a power unit 12 that comprises at least one of an internal combustion (IC) engine or an electric drive source. The power unit
5 12 is coupled to a rear wheel 16. In one embodiment, the power unit 12 is swingably connected to the frame. In one embodiment, the power unit 12 is mounted to a swing arm (not shown) and the swing arm is swingably connected to the frame. Further, the vehicle 10 includes a transmission means (not shown) coupling the rear wheel 16 to the power unit 12. The transmission
10 means includes a continuously variable transmission, an automatic transmission, or a fixed ratio transmission. A seat assembly 29 is disposed above the power unit 12 and is supported by the left side frame and the right side frame. The seat assembly 29 is hingedly openable. The frame defines a step-through portion ahead of the seat assembly 29. The floorboard 18 is
15 disposed at the step-through portion, wherein a rider can operate the vehicle 10 in a seated position by resting feet on the floorboard 18. Further, the floorboard 18 is capable of carrying loads.

[018] Further, the frame is covered by plurality of body panels including a front panel assembly 30 having a front style panel 30A and a rear panel 30B, an
20 under-seat cover 32, and a left and a right-side panel 33 disposed on the frame and covering the frame and parts mounted thereof.

[019] In addition, a front fender 24 is covering at least a portion of the front wheel 14. A utility box (not shown) is disposed below the seat assembly 29 and is supported by the frame. A rear fender 26 is covering at least a portion of the rear wheel 16 and is positioned upwardly of the rear wheel 16. One or more
5 rear suspension(s) 46 are provided in the rear portion of the vehicle 10 for connecting the swing arm and the rear wheel 16 to the frame for damping the forces from the rear wheel 16 and the engine (not shown) from reaching the frame.

[020] Furthermore, the vehicle 10 comprises of plurality of electrical and
10 electronic components including a headlight 36, a taillight 38, an alternator (not shown), and an integrated starter generator.

[021] Figure 2 illustrates a front view of the saddle type vehicle 10 in accordance with an embodiment of the invention. As mentioned earlier, the saddle type vehicle 10 has the head pipe 22 and the main frame that extends
15 downwardly and rearwardly from the head pipe. As illustrated in Figure 2 and Figure 3, the rear panel 30B extends in a vehicle up down direction. Particularly, the rear panel 30B extends in the vehicle up down direction along the head pipe 22 and the main frame. The saddle type vehicle 10 further has a control unit 100. In an embodiment, the control unit 100 is an integrated
20 controller that is configured to control the integrated starter generator (ISG) and act as the controller for hybrid assist functionality. In an embodiment, the

saddle type vehicle 10 is a mild hybrid type vehicle wherein an electric motor assists the internal combustion engine. In an embodiment, the ISG, in addition to performing the starter and generator function, assists the internal combustion engine when required. The hybrid assist functionality controls the vehicle 10 to rely solely on electric power of the ISG in riding conditions such as coasting or braking, and swiftly restarting the internal combustion engine when required.

[022] As further illustrated in Figure 2, the control unit 100 is supported on the rear panel 30B. As illustrated in Figure 3, the control unit 100 is disposed forwardly of the head pipe 22. Further, the control unit 100 is offset from a vehicle centreline (X-X') in a vehicle width direction.

[023] As illustrated in the embodiment depicted in Figure 2, the control unit 100 is disposed offset to a right side from the vehicle centreline (X-X') in a vehicle front view. This means, that the control unit 100 is disposed offset to a left side from the vehicle centreline (X-X') in a vehicle rear view. In an alternate embodiment, control unit 100 is disposed offset to a left side from the vehicle centreline (X-X') in a vehicle front view, meaning that control unit 100 is disposed offset to a right side from the vehicle centreline (X-X') in a vehicle rear view.

[024] In an embodiment, the saddle type vehicle 10 has the front style panel 30A. Similar to the rear panel 30B, the front style panel 30A extends in the

vehicle up down direction. In particular, the front style panel 30A extends in the vehicle up down direction abutting the rear panel 30B. As a result of this, a space is defined between the front style panel 30A and the rear panel 30B. In an embodiment, the control unit 100 is disposed in the space defined between the front style panel 30A and the rear panel 30B. By virtue of this, the control unit 100 is disposed in an enclosed space between the front style panel 30A and the rear panel 30B which prevents the control unit 100 against dust and water ingress and prevents the control unit 100 from direct impacts. Also, since the front style panel 30A is detachably mounted on the vehicle 10, the front style panel 30A can be easily removed or detached from the vehicle 10, thus easing the access to the control unit 100 for better serviceability.

[025] As further referenced in Figure 2, in an embodiment, the saddle type vehicle 10 comprises a pair of slots 120 that are provided between the front style panel 30A and the rear panel 30B. The pair of slots 120 are provides so as to accommodate the pair of front suspension members 44 for the front wheel 14. Herein, the pair of slots 120 are in fluid communication with the space defined between the front style panel 30A and the rear panel 30B. As a result, the air entering the pair of slots 120 is passed on to the space defined between the front style panel 30A and the rear panel 30B. The air entering the space defined between the front style panel 30A and the rear panel 30B, especially

as the vehicle 10 moves, is passed over the control unit 100, thus providing adequate ventilation and cooling to the control unit 100.

[026] To facilitate the disposition of the control unit 100 on the rear panel 30B, as illustrated in Figure 4, the saddle type vehicle 10 comprises a first bracket 130 that is configured to be mounted on the rear panel 30B. A second bracket 140 is configured to receive the control unit 100. The second bracket 140 is attached to the first bracket, thereby supporting the control unit 100 on the rear panel 30B. In an embodiment, one or more fasteners are provided that are configured to pass through one or more through holes provided on the second bracket 140, the first bracket 130 and the rear panel 30B for securely mounting the control unit 100 on the rear panel 30B.

[027] In an embodiment, as referenced in Figures 3 and 4, the saddle type vehicle 10 has a battery 150 that provides power at least to the Integrated Starter Generator and the control unit 100. As illustrated, the battery 150 is mounted forwardly of the head pipe 22. Further, the control unit 100 is disposed rearwardly of the battery 150 in a vehicle side view. Such a disposition ensures that ample packaging space is still available within the space defined between the front style panel 30A and the rear panel 30B, which allows for accommodation of other vehicle and electric components as required.

[028] Advantageously, the present invention provides a saddle type vehicle in which a control unit, especially a control unit that controls the ISG and acts as

a hybrid assist controller, is placed away from the engine or the power unit of the vehicle, thus ensuring that the control unit is not susceptible to high temperatures of the power unit, thus preventing control unit failure.

[029] Further, disposition of the control unit in the space defined between the front style panel and the rear panel ensures that adequate air flows over the control unit, thus regulating the temperatures of the control unit within permissible limits. Such a disposition also allows for the control unit to be easily serviceable when required.

[030] Furthermore, disposition of the control unit as in the present invention ensures that ample packaging space is available for packaging of other vehicle and electric components.

[031] While the present invention has been described with respect to certain embodiments, it will be apparent to those skilled in the art that various changes and modification may be made without departing from the scope of the invention as defined in the following claims.

CLAIMS:

1. A saddle type vehicle (10), the saddle type vehicle (10) comprising:
a head pipe (22);
a main frame extending downwardly and rearwardly from the head pipe
5 (22);
a rear panel (30B) extending in a vehicle up down direction, the rear panel
(30B) extending along the head pipe (22) and the main frame; and
a control unit (100) supported on the rear panel (30B), the control unit (100)
being disposed forwardly of the head pipe (22) and being disposed offset
10 from a vehicle centreline (X-X') in a vehicle width direction.
2. The saddle type vehicle (10) as claimed in claim 1, wherein the control unit
(100) is an integrated controlled configured to control and an Integrated
Starter Generator and a hybrid assist functionality of the saddle type vehicle
15 (10).
3. The saddle type vehicle (10) as claimed in claim 1, wherein the control unit
(100) is disposed offset to a left side from the vehicle centreline (X-X') in a
vehicle rear view.

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4. The saddle type vehicle (10) as claimed in claim 1, wherein the control unit (100) is disposed offset to a right side from the vehicle centreline (X-X') in a vehicle rear view.
5. The saddle type vehicle (10) as claimed in claim 1, comprising a front style panel (30A) extending in a vehicle up down direction abutting the rear panel (30B), the front style panel (30A) and the rear panel (30B) defining a space therebetween, and the control unit (100) being disposed in the space defined between the front style panel (30A) and the rear panel (30B).
- 10 6. The saddle type vehicle (10) as claimed in claim 5, wherein a pair of slots (120) are provided between the front style panel (30A) and the rear panel (30B) to accommodate a pair of suspension members (44) for a front wheel (14), the pair of slots (120) being in fluid communication with the space
- 15 defined between the front style panel (30A) and the rear panel (30B), such that air entering the pair of slots (120) is passed on to the space defined between the front style panel (30A) and the rear panel (30B).
- 20 7. The saddle type vehicle (10) as claimed in claim 1, comprising a first bracket (130) configured to be mounted on the rear panel (30B); and a second bracket (140) configured to receive the control unit (100), the second

bracket (140) being attached to the first bracket (130), thereby supporting the control unit (100) on the rear panel (30B).

8. The saddle type vehicle (10) as claimed in claim 1, comprising a battery
5 (150) for powering at least an Integrated Starter Generator and the control unit (100), the battery (150) being mounted forwardly of the head pipe (22).
9. The saddle type vehicle (10) as claimed in claim 8, wherein the control unit (100) is disposed rearwardly of the battery (150) in a vehicle side view.

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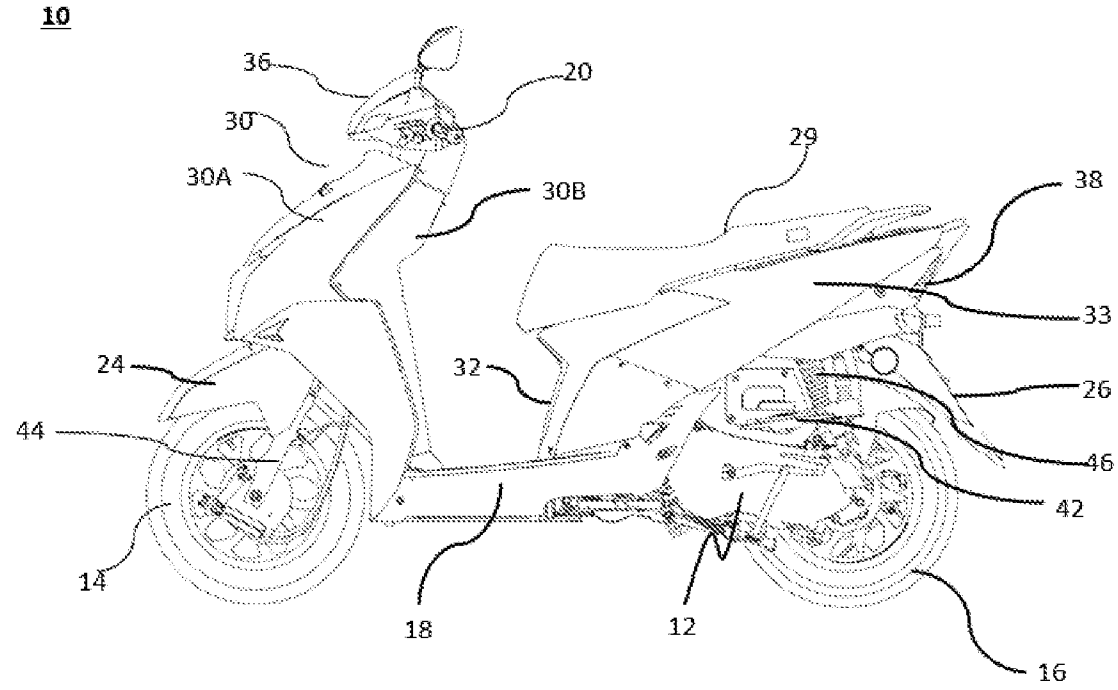


Figure 1

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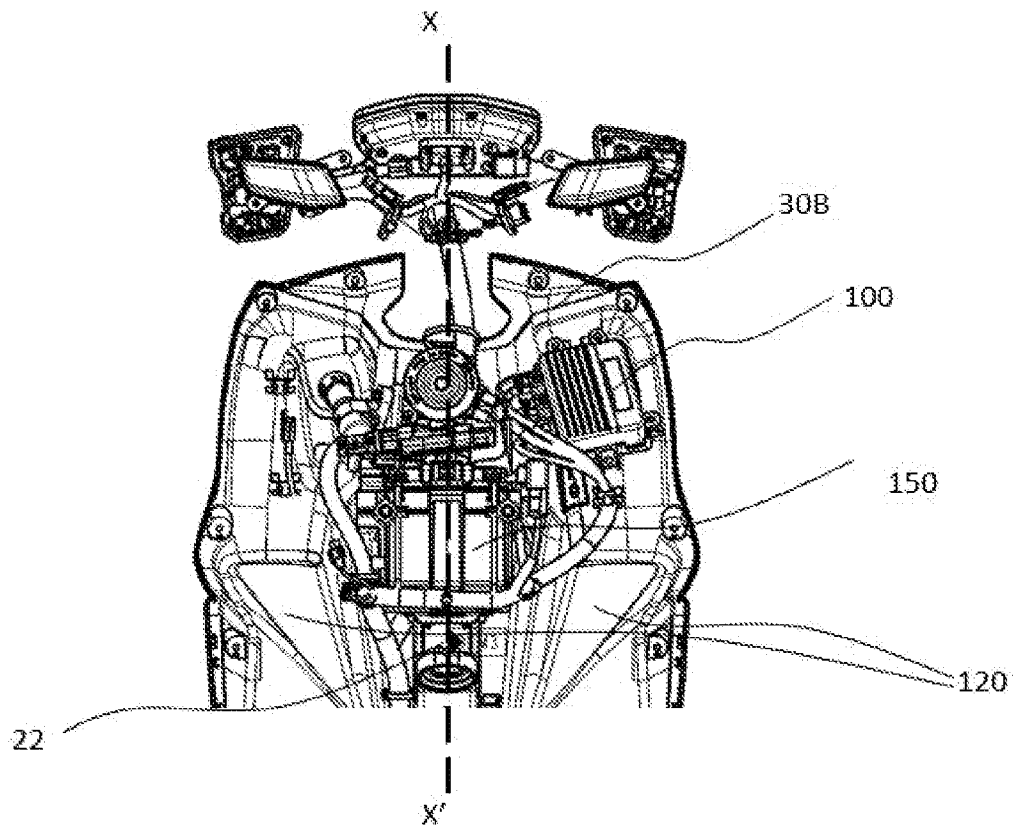


Figure 2

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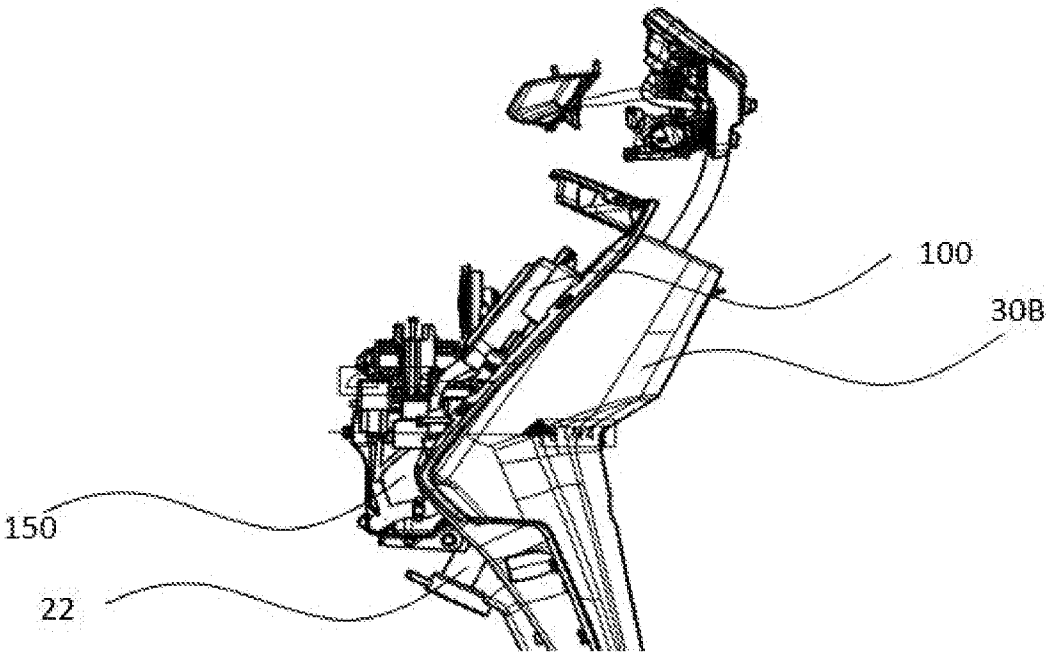


Figure 3

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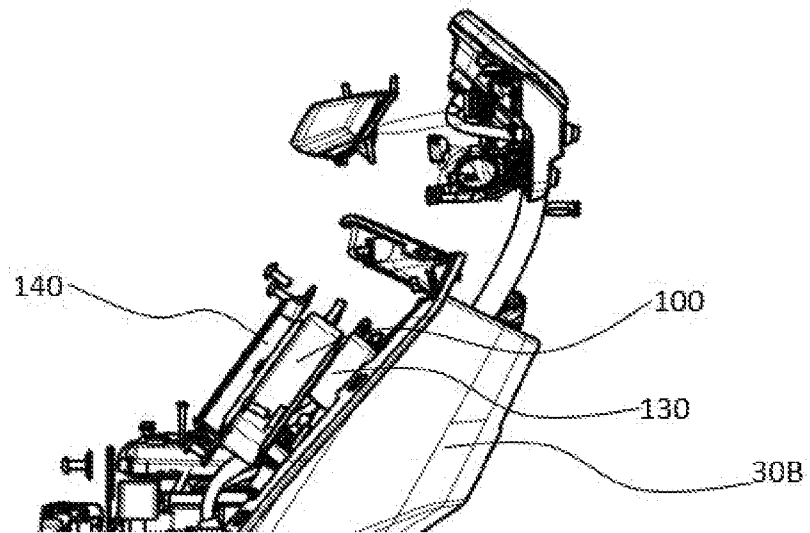


Figure 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IN2022/051039

A. CLASSIFICATION OF SUBJECT MATTER

B62J99/00 Version=2023.01

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)

B62J

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

Electronic database consulted during the international search (name of database 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	WO 2022113115 A1 (TVS MOTOR CO LTD) 02 June 2022 (02-06-2022) & no family figures 3,4, claims 1, 4, para [0017], [0027], [0028], [0030], [0037]	1-5, 7-9
Y	figures 3,4, claims 1, 2, para [0017], [0027], [0028], [0030], [0037]	6
Y	EP 3539855 A1 (YAMAHA MOTOR CO LTD) 18 Sept 2019 (18-09-2019) figure 2, para [0018], [0032]	6



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

01-03-2023

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IN2022/051039

Citation	Pub.Date	Family	Pub.Date
EP 3539855 A1	18-09-2019	EP 3539855 B1	19-08-2020
		JP 2019156314 A	19-09-2019
		PH 12019050023 A1	01-07-2019
		PH 12019050023 B1	01-07-2019
		TW 201938433 A	01-10-2019
		TW I712535 B	11-12-2020