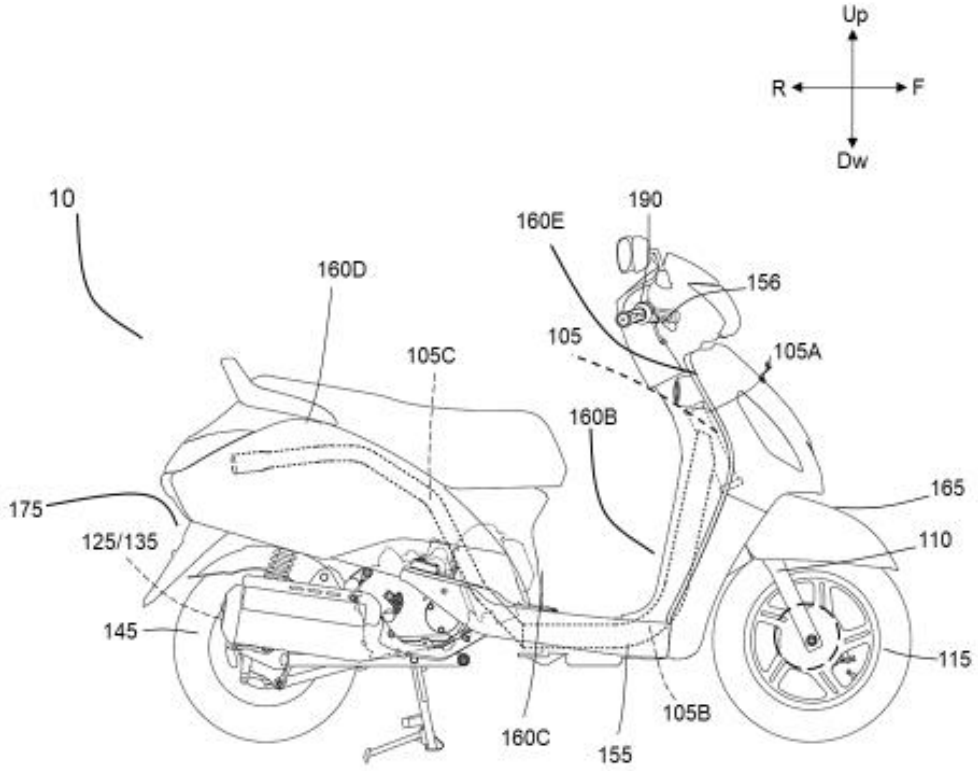

Figure 1

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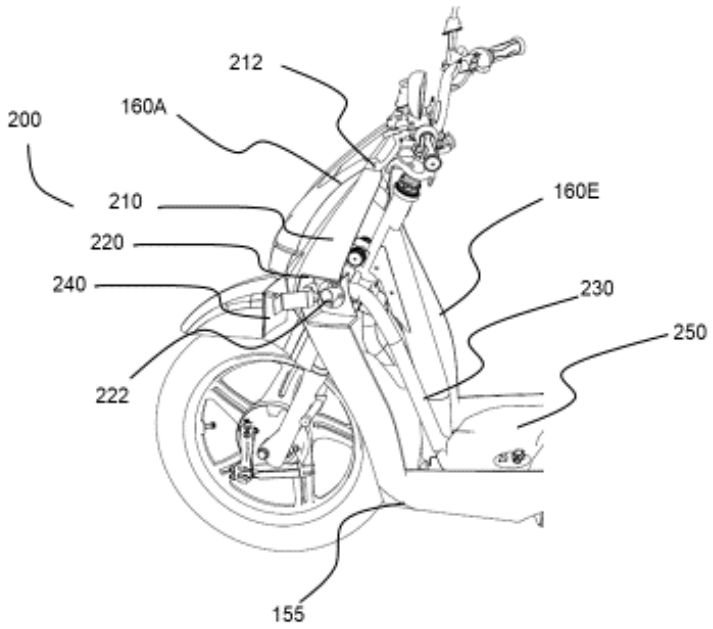

Figure 2

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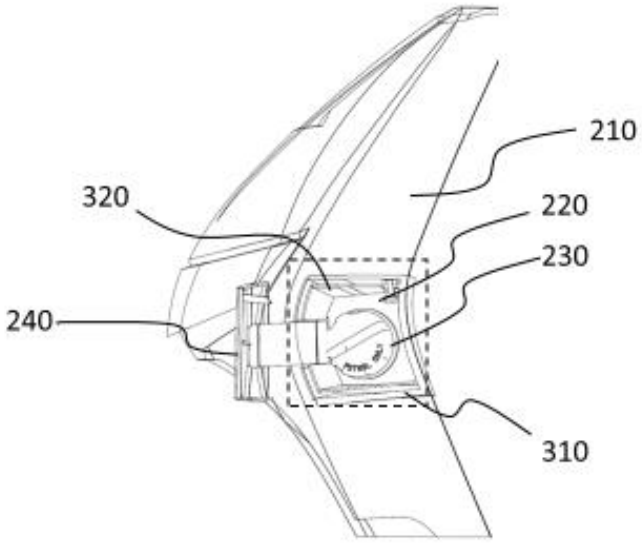

Figure 3

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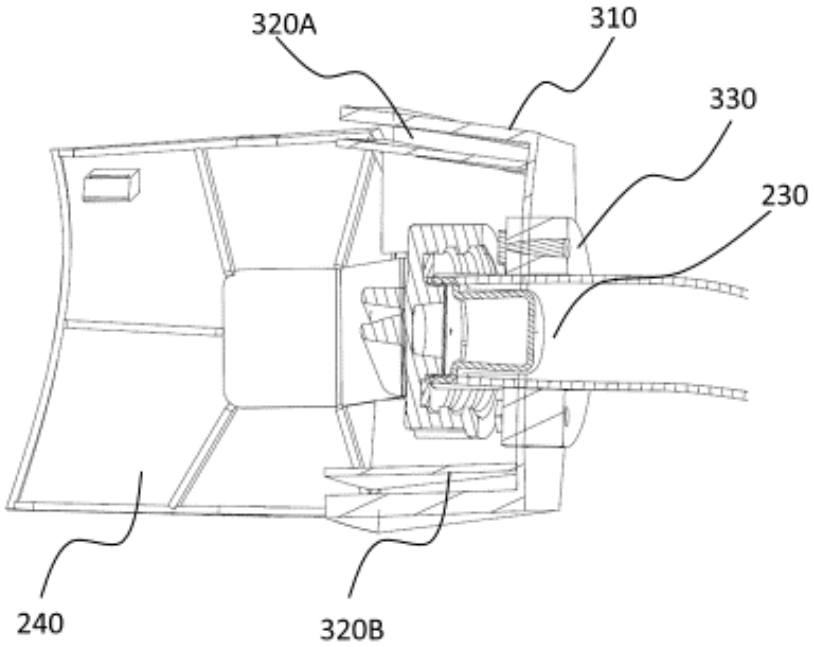

Figure 4

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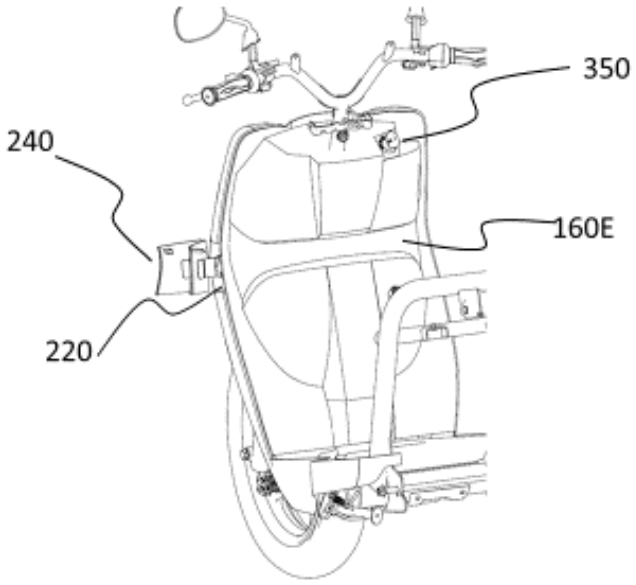

Figure 5

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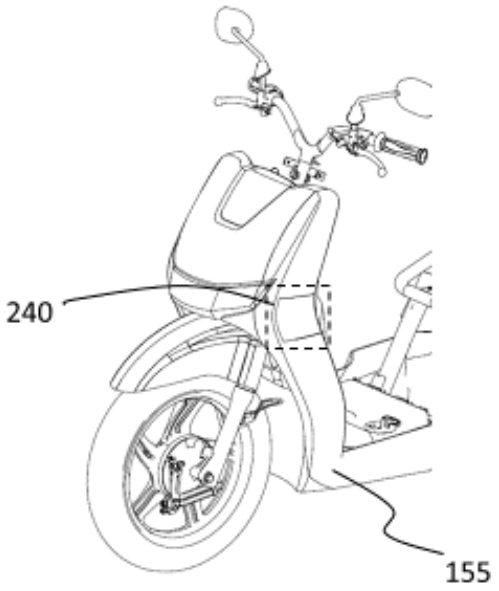

Figure 6

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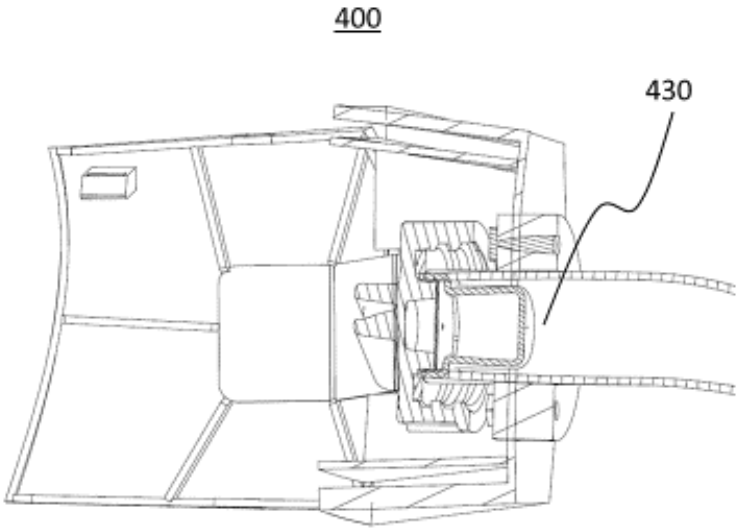

Figure 7

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FORM 2

THE PATENTS ACT, 1970

(39 OF 1970)

&

THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

[*See* section 10, Rule 13]

TITLE OF INVENTION

A Fuel Filing Inlet Assembly for Two-Wheeled Vehicles

APPLICANT

TVS MOTOR COMPANY LIMITED, an Indian company, having its address at "Chaitanya", No.12 Khader Nawaz Khan Road, Nungambakkam, Chennai 600 006, India.

PREAMBLE TO THE DESCRIPTION

The following specification particularly describes the invention and the manner in which it is to be performed.

FIELD OF THE INVENTION

[001] The present invention generally relates to two-wheeled vehicles, and more particularly to a fuel filling inlet assembly for the two-wheeled vehicles. The present invention also relates to a charging socket assembly for two-wheeled electric vehicles.

BACKGROUND OF THE INVENTION

[002] Two-wheeled vehicles, whether they run by an internal-combustion engine or are electrically powered, require a refuelling or recharging system. In conventional two-wheeled vehicles that are run by an internal combustion engine, the fuel filling systems generally comprise of a fuel tank, a fuel inlet and a fuel pipe to connect the fuel inlet to the tank. Typically, in scooter-type two wheelers, these fuel systems are packaged on the underside of the seat, and behind the utility box, with the fuel inlet being positioned under the seat or near the tail lamp.

[003] The placement of the fuel inlet under the seat necessitates that the rider and the pillion dismount from the vehicle for fuel-filling. Even when the fuel inlet is placed near the tail lamp instead of being under the seat, the rider still needs to dismount to ensure proper fuel-filling at a fuel station, and close the lid of the fuel inlet. The potential of fuel drops being spilled on the muffler also poses a safety risk.

[004] It is also known in the art to provide the fuel inlet on a tail cover assembly behind the seat. Even though there is no necessity for the rider to open the seat for filling fuel in this case, such a location also pose the problems of fuel spilling. Moreover, since the position of the fuel filling is behind the rider's seat, it requires rider's attention and sometimes the rider has to get down during fuel filling for closing the fuel filling lid after filling of fuel.

[005] To this end, some known scooter-type two-wheeled vehicles have fuel systems in which the fuel tank is packaged under the floorboard, and since the position of the fuel inlet is dependent on the positioning of the fuel tank, the fuel inlet is positioned on the rear panel towards the front of the rider position. However, such fuel systems have severe limitations in terms of fuel-filling when floorboard is loaded to a height above the fuel inlet, potential risk of fuel spillage on the floorboard, and restrictions in the packaging of mobile charging slot and the glove box space. The feasibility of positioning the fuel inlet on the front panel is ruled out as such a positioning would have a high safety risk in case of a crash, and would not be accessible to the rider, especially when the floorboard is loaded.

[006] Similar problems would persist in the case of electrically powered scooter-type two-wheeled vehicles if the charging socket for a battery is positioned either under the seat or on the rear panel in front of the rider position.

[007] Thus, there is a need in the art for a fuel system or a recharging system with the positioning of fuel-filling inlet or charging socket which addresses at least the aforementioned problems.

SUMMARY OF THE INVENTION

[008] In one aspect, the present invention is directed to a two-wheeled vehicle having a fuel filling inlet assembly. The fuel filing inlet assembly comprises a side skirt abutting a front panel and a rear panel, the side skirt extends between a side skirt apex and a bottom structure; a recess formed in the side skirt and the recess has an aperture; and a fuel inlet opening which is accessible through the aperture for supplying fuel to a fuel tank. In an embodiment of the invention, the bottom structure is a floorboard of the vehicle.

[009] In an embodiment of the invention, the recess is centrally positioned between the side skirt apex and the bottom structure or the floorboard. In another embodiment, the recess is positioned at an extreme end of the side skirt in a transverse direction of the side skirt, when viewing from the side of the vehicle. In a further embodiment, the recess is positioned between a shoulder and trim lines of the side skirt.

[010] In another embodiment of the invention, the fuel filling inlet assembly comprises a c-shaped box section disposed inside the recess and attached to vehicle body. In an embodiment, the fuel filling inlet assembly has a fuel inlet

flange formed on the vehicle body which is configured to receive the c-shaped box section. In another embodiment, the fuel filling inlet assembly has a stiffener member abutting the c-shaped box section thereby providing protection to the fuel filling inlet assembly. In an embodiment, the fuel filling inlet assembly has a top stiffener member and a bottom stiffener member, which forms a c-section along the fuel inlet flange. In an embodiment, the fuel inlet flange runs vertically between the top stiffener member and the bottom stiffener member.

[011] In yet another embodiment of the invention, the fuel filling inlet assembly has a lid for covering the recess. In an embodiment, the fuel filling inlet assembly has a wire having a first end coupled with the lid and a second operable end to operate the lid. In another embodiment, the second operable end of the wire is coupled with an ignition lock. In a further embodiment, the lid is pivotally mounted on the c-shaped box section. In yet another embodiment, the lid is pivotally mounted on the recess.

[012] In another aspect, the present invention is directed to a two-wheeled electric vehicle having a charging socket assembly. The charging socket assembly having a side skirt abutting a front panel and a rear panel. The side skirt extends between a side skirt apex and a bottom structure. A recess is formed in the side skirt such that the recess has an aperture. A charging socket can be accessed through the aperture for charging a battery.

BRIEF DESCRIPTION OF THE DRAWINGS

[013] Reference will be made to embodiments of the invention, examples of 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 shows a right-side view of an exemplary vehicle in accordance with an embodiment of the invention.

Figure 2 shows a perspective view of a fuel filling inlet assembly in accordance with an embodiment of the invention.

Figure 3 shows the recess of the fuel filling inlet assembly in a side view of the fuel filling inlet assembly in accordance with an embodiment of the invention.

Figure 4 shows a sectional view of the fuel filling inlet assembly in accordance with an embodiment of the invention.

Figure 5 shows a perspective view of the fuel filling inlet assembly with the lid in an open position in accordance with an embodiment of the invention.

Figure 6 shows a perspective view of the fuel filling inlet assembly with the lid in a closed position in accordance with an embodiment of the invention.

Figure 7 shows a sectional view of a charging socket assembly for a two-wheeled electric vehicle in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[014] The present invention relates to a two-wheeled vehicle having a fuel filling inlet assembly.

[015] Figure 1 illustrates a right-side view of an exemplary vehicle 10, in accordance with an embodiment of the present subject matter. The vehicle 10 comprises a frame assembly 105. The frame assembly 105 includes a head tube 105A, a main frame assembly 105B. One or more front suspensions 110 connect a front wheel 115 to a handlebar assembly 190, which forms a steering assembly of the vehicle 10. The steering assembly is rotatably disposed about the head tube 105A. The main frame assembly 105B extends rearwardly downward from the head tube 105A and includes a bent portion thereafter extending substantially in a longitudinal direction. Further, the frame assembly 105 includes one or more rear tubes 105C extending inclinedly rearward from a rear portion of the main frame assembly 105B towards a rear portion of the vehicle 10.

[016] The vehicle 10 includes a power unit comprising at least one of an internal combustion (IC) engine 125 and a traction motor 135. For example, the traction motor 135 may include a brush less direct current (BLDC) motor.

The power unit is coupled to the rear wheel 145. In one embodiment, the IC engine 125 is swingably connected to the frame assembly 105. In one embodiment, the IC engine 125 is mounted to the swing arm 141 and the swing arm 141 is swingably connected to the frame assembly 105. The traction motor 135, in one embodiment, is disposed adjacent to the IC engine 125. In one embodiment, the traction motor 135 is hub mounted to the rear wheel 145. Further, the vehicle 10 includes a transmission means 131 coupling the rear wheel 145 to the power unit. The transmission means 131 includes a continuously variable transmission, an automatic transmission, or a fixed ratio transmission. A seat assembly 151 is disposed above the power unit and is supported by the rear tubes 105C of the frame assembly 105. The seat assembly 151 is hingedly openable. The frame assembly 105 defines a step-through portion ST ahead of the seat assembly 151. A bottom structure 155 in the form of a floorboard is disposed at the step-through portion ST, wherein a rider can operate the vehicle 10 in a seated position by resting feet on the floorboard 155. Further, the floorboard 155 is capable of carrying loads.

[017] Further, the frame assembly 105 is covered by plurality of body panels including a front panel 160A, a leg shield 160B, an under-seat cover 160C, a left and a right-side panel 160D, and a rear panel 160E mounted on the frame assembly 105 and covering the frame assembly 105 and parts mounted thereof.

[018] In addition, a front fender 165 is covering at least a portion of the front wheel 115. A utility box is disposed below the seat assembly 151 and is supported by the frame assembly 105. A rear fender 175 is covering at least a portion of the rear wheel 145 and is positioned upwardly of the rear wheel 145. One or more suspension(s) 195 are provided in the rear portion of the vehicle 10 for connecting the swing arm 141 and the rear wheel 145 to the frame assembly 105 for damping the forces from the wheel 145 and the power unit from reaching the frame assembly 105.

[019] Furthermore, the vehicle 10 comprises of plurality of electrical and electronic components including a headlight 185A, a taillight 185B, a transistor-controlled ignition (TCI) unit (not shown), and an alternator (not shown), a starter motor (not shown).

[020] Referring to Figure 2, the fuel filling inlet assembly 200 is provided in a side skirt 210 of the vehicle 10. The side skirt 210 abuts the front panel 160A and the rear panel 160E. A side skirt apex 212 is a point wherein the front panel 160A, the rear panel 160E and the topmost point of the side skirt 210 are in contact with each other. The side skirt 210 extends between the side skirt apex 212 and the bottom structure 155. In an embodiment of the invention, the bottom structure 155 is a floorboard. A recess 220 is formed in the side skirt 210 wherein the recess 220 has an aperture 222. A fuel inlet opening 230 is provided in fluid communication with the fuel tank 250 packaged under the floorboard 155 such that the fuel inlet opening 230 is

accessible through the aperture 222. The fuel inlet opening 230 may be covered by a threadedly engaged openable cap. In a fuel filling operation, the fuel inlet opening 230 will be accessed through the aperture 222 by a fuel gun and the fuel will travel from the fuel inlet opening 230 to the fuel tank 250. Such an access to the fuel inlet opening 230 ensures that the rider need to not dismount the vehicle for a fuel filling operation. Also, the packaging of the fuel tank 250 under the floorboard 155 leads to better weight distribution and greater space in the utility box.

[021] In an embodiment of the present invention, the recess 220 in the side skirt 210 is provided such that the recess 220 is positioned at a central position with respect to the side skirt apex 212 and the floorboard 155. In another embodiment of the present invention, the recess 220 in the side skirt 210 is provided such that the recess 220 is positioned at an extreme end of the side skirt 210 in a transverse direction of the side skirt 210, when viewing from the side of the two-wheeled vehicle 10. Such a position of the recess 220 ensures that the fuel gun is always away from the rider feet position and there is no fuel spillage on the floorboard 155. In another embodiment of the present invention, the recess 220 is provided on the side skirt 210 adjoining the turn signal lamp. In a further embodiment of the present invention, the recess 220 is provided on the side skirt 210 substantially above the front fender 165 when viewing from a side of the two-wheeled vehicle 10. In another embodiment of the present invention, the recess 220 in the side skirt

210 is provided such that the recess 220 is positioned between a shoulder and trim lines of the side skirt 210, which gives the two-wheeled vehicle 10 an enhanced assessment in the Final Vehicle Product Audit.

[022] Figure 3 illustrates the recess 220 of the fuel filling inlet assembly 200 in a side view of the fuel filling inlet assembly 200 in accordance with an embodiment of the present invention. As shown, the fuel filling inlet assembly 200 has a c-shaped box section 310 which is disposed inside the recess 220 and is attached to the vehicle body as shown in the Figure. As the fuel filling inlet assembly 200 is exposed to vehicles parked on the side of the two-wheeled vehicle 10, or might be the first to receive the impact in a case when the two-wheeled vehicle 10 falls on the side or in an accident with another vehicle, the c-shaped box section 310 strengthens the fuel filling inlet assembly 200. Further, when a fuel gun is made to suspend from the fuel inlet opening 230 it results in a load transfer to the fuel filling inlet assembly 200. In such cases too, the c-shaped box section 310 disposed inside the recess 220 provides strength to the fuel inlet assembly to bear the load. In addition to these, the c-shaped box section 310 also acts as a deflector for over filled fuel.

[023] Further, as shown in Figure 3, a stiffener member 320 is provided within the c-shaped box section 310 abutting an inner wall of the c-shaped box section 310 and thereby providing additional protection to the fuel filling inlet assembly 200. The c-shaped box section 310 together with the stiffener

member 320 ensures that any impact from the side is first received by the stiffener member 320.

[024] As shown in Figure 4, the c-shaped box section 310 is attached to vehicle body by means of a fuel inlet flange 330. Fuel inlet flange 330 is a component of chassis or vehicle body. The c-shaped box section 310 may be attached to the fuel inlet flange 330 by fasteners or by a welded joint. The fuel inlet flange 330 also acts as an arrester for fuel leakages.

[025] In an embodiment of the present invention, as shown in Figure 4, the fuel filling inlet assembly 200 has of a top stiffener member 320A and a bottom stiffener member 320B which form a c-section along the fuel inlet flange 330. The fuel inlet flange 330 runs vertically between the top stiffener member 320A and the bottom stiffener member 320B.

[026] As shown in Figures 2 to 6, the fuel filling inlet assembly 200 has a lid 240 that is openable to cover the recess 220. In an embodiment of the invention, the lid 240 may be pivotally mounted on the c-shaped box section 310 or may be pivotally mounted on the recess 220.

[027] As shown in Figure 5, the lid 240 is operable by an ignition lock 350. In this regard, a wire having a first end is coupled with the lid 240 and a second operable end coupled with the ignition lock 350. Accordingly, operation of the ignition lock causes the lid 240 to open. It is well understood that a dedicated means may be provided to operate the wire to open the lid 240.

[028] Figure 6 illustrates a perspective view of the fuel filling inlet assembly 200 with the lid 240 in a closed position in accordance with an embodiment of the present invention. In this embodiment, the figure shows the lid 240 in a closed position. The lid 240 is so pivoted that it is flushed with the trim lines of the side skirt 210 of the vehicle 10 thereby improving the aesthetics of the vehicle 10.

[029] In an exemplary embodiment of the present invention, the lid 240 is openable towards front side of the vehicle 10 which improves the accessibility of the fuel inlet opening 230 for the rider.

[030] In an alternative embodiment of the present invention, as shown in Figure 7, where the two-wheeled vehicle 10 is an electric type two-wheeled vehicle, the fuel filling inlet assembly 200 may be alternatively used as a charging socket assembly 400. In this regard, the fuel inlet opening 230 is replaced by a charging socket 430, the fuel tank 250 is replaced by a battery, and the charging socket 430 is in electrical communication with the battery. Remaining components of the fuel filing inlet assembly 200 described hereinbefore may be accordingly modified to meet the requirements of an electric vehicle.

[031] Advantageously, the present invention solves the problem of rider having to dismount from the vehicle for fuel-filling, and the problem of severe limitations in terms of fuel-filling when floorboard is loaded to a height above the fuel inlet, potential risk of fuel spillage on the floorboard, and restrictions

in the packaging of mobile charging slot and the glove box space. Due to the position of the fuel inlet opening in the fuel filling inlet assembly in accordance with the present invention as disclosed hereinabove, the rider and the pillion need not dismount from the vehicle for fuel-filling, and in cases when the floorboard is loaded to a height above the fuel inlet, the rider can still easily access the fuel inlet opening without having to disembark the items from the floorboard. This also results in improved floorboard loading capabilities of the two-wheeled vehicle. Since the fuel filling inlet assembly is positioned towards the side of the two-wheeled vehicle, the packaging of mobile charging slot and glove box are not restricted, and the risk of fuel spillage on the floorboard is minimised. Further, since the fuel filling inlet assembly is positioned towards the front of the vehicle, the rider can ensure fuel cap closure and the available space in the utility box is increased.

[032] 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.

WE CLAIM:

1. A two-wheeled vehicle comprising: a fuel filling inlet assembly (200), the fuel filing inlet assembly comprising:

   a side skirt (210) abutting a front panel (160A) and a rear panel (160E), the side skirt (210) extending between a side skirt apex (212) and a bottom structure (155);

   a recess (220) formed in the side skirt (210), the recess (220) having an aperture (222); and

   a fuel inlet opening (230) accessible through the aperture (222) for supplying fuel to a fuel tank (250).

2. The two-wheeled vehicle as claimed in claim 1, wherein the recess (220) is centrally positioned between the side skirt apex (212) and the bottom structure (155).

3. The two-wheeled vehicle as claimed in claim 1 or 2, wherein the bottom structure (155) comprises a floorboard (155).

4. The two-wheeled vehicle as claimed in claim 1, wherein the recess (220) is positioned at an extreme end of the side skirt (210) in a transverse direction of the side skirt (210), when viewing from the side of the vehicle.

5. The two-wheeled vehicle as claimed in claim 1, wherein the recess (220) is positioned between a shoulder and trim lines of the side skirt (210).

6. The two-wheeled vehicle as claimed in claims 1 to 5, wherein the fuel filing inlet assembly (200) comprises a c-shaped box section (310) disposed inside the recess (220) and attached to vehicle body.

7. The two-wheeled vehicle as claimed in claim 6, comprising a fuel inlet flange (330) formed on the vehicle body and configured to receive the c-shaped box section (310).

8. The two-wheeled vehicle as claimed in claim 6 or 7, comprising a stiffener member (320) abutting the c-shaped box section (310) thereby providing protection to the fuel filling inlet assembly (200).

9. The two-wheeled vehicle as claimed in claim 8, comprising a top stiffener member (320A) and a bottom stiffener member (320B) forming a c-section along the fuel inlet flange (330) that runs vertically between the top stiffener member (320A) and the bottom stiffener member (320B).

10. The two-wheeled vehicle as claimed in claim 1, wherein the fuel filing inlet assembly (200) comprises a lid (240) for covering the recess (220).

11. The two-wheeled vehicle as claimed in claim 10, comprising a wire having a first end coupled with the lid and a second operable end to operate the lid (240).

12. The two-wheeled vehicle as claimed in claim 11, wherein the second operable end is coupled with an ignition lock (240).

13. The two-wheeled vehicle as claimed in claim 10, wherein the lid (240) is pivotally mounted on the c-shaped box section (310).

14. The two-wheeled vehicle as claimed in claim 10, wherein the lid (240) is pivotally mounted on the recess (220).

15. A two-wheeled electric vehicle comprising: a charging socket assembly, the charging socket assembly, comprising:

a side skirt (210) abutting a front panel (160A) and a rear panel (160E), the side skirt (210) extending between a side skirt apex (212) and a bottom structure (155);

a recess (220) formed in the side skirt (210), the recess (220) having an aperture (222); and

a charging socket accessible through the aperture (222) for charging a battery.

Dated this 14th day of December 2020

TVS MOTOR COMPANY LIMITED
By their Agent & Attorney

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ABSTRACT

A Fuel Filing Inlet Assembly for Two-Wheeled Vehicles

The present invention relates to two-wheeled vehicles having a fuel filling inlet assembly 200. The fuel filling inlet assembly 200 comprising a side skirt 210 abutting a front panel 160A and a rear panel 160E, the side skirt 210 extending between a side skirt apex 212 and a floorboard 155; a recess 220 formed in the side skirt 210, the recess 220 having an aperture 222; and a fuel inlet opening 230 accessible through the aperture 222 for supplying fuel to a fuel tank 250. The fuel filling inlet assembly 200 further has a c-shaped box section 310 that is disposed inside the recess 220. A stiffener member 320 abuts the c-shaped box section 310. The fuel filling inlet assembly 200 may alternatively be a charging socket assembly 400.

Reference Figure 2