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(71) Applicant *(for all designated States except US)*: **TVS MOTOR COMPANY LTD** [IN/IN]; Jayalahshmi Estate, 24 (old #8), Haddows Road, Chennai 600 006 (IN).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **NILESHWAR, Pramila, Rao** [IN/IN]; Jayalahshmi Estate, 24 (old #8), Haddows Road, Chennai 600006 (IN). **CHITHAMBARAM, Subramoniam** [IN/IN]; Jayalahshmi Estate, 24 (old #8), Haddows Road, Chennai 600 006 (IN). **SAMRAJ, Jabez, Dhinagar** [IN/IN]; Jayalahshmi Estate, 24 (old #8), Haddows Road, Chennai 600 006 (IN). **HARNE, Vinay, Chandrakant** [IN/IN]; Jayalahshmi Estate, 24 (old #8), Haddows Road, Chennai 600 006 (IN).

(74) Agents: **VARADHACHARI, Lakshmikumaran** et al.; Lakshmikumaran & Sridharan Advocates, B6/10, Safdarjung Enclave, New Delhi 110 029 (IN).

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(54) Title: ELECTRICAL SYSTEM FOR A STEP THROUGH TWO WHEELED VEHICLE

(57) Abstract: The subject matter described herein relates to a step-through two wheeled vehicle. According to one embodiment of the present subject matter, a electrical system is disposed underneath the footboard of the two wheeled vehicle. The electrical system includes battery packs such that each of the battery pack has a temperature sensor mounted on it and has a blower provided in a forward portion of the battery pack. A controller operates the blowers when the temperature of the battery packs exceeds the threshold value. The electrical system is covered by a bottom panel having the louvers formed on its surface to provide natural cooling of the battery packs when the two wheeled vehicle is in running condition

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ELECTRICAL SYSTEM FOR A STEP THROUGH TWO WHEELED VEHICLE

TECHNICAL FIELD

The subject matter described herein, in general, relates to a step-through two wheeled vehicle and in particular relates to an electrical system for a step through two wheeled vehicle.

BACKGROUND

In order to reduce the air pollution and preserve the depleting crude oil, great attention has been given to the problem of reduction of fuel consumption in vehicles and to reduce the pollutants emitted by vehicles. Vehicles driven by electric motors were developed as one such solution proposed for the aforesaid problem. Such vehicles are powered using an electric drive system having the electric motor as a powering source, a battery pack for the electric motor and a controller. The controller manages the operations of the electric motor and the battery pack. Positioning of battery pack in the electric motor driven two-wheeled vehicle may be critical task due to limited availability of space.

Conventionally in the two-wheeled electric vehicles, the battery pack is disposed within a utility box area below the seat. Positioning of the battery pack inside the utility box leads to wastage of space that could have been used for storing other articles. This arrangement also prevents the dissipation of heat that is generated during charging and discharging of the battery pack resulting in decreased efficiency.

Therefore, there is a need to for a electrical system that is disposed in a manner which allows proper utilization of available space, and providing adequate cooling arrangement for the battery pack within the two-wheeled vehicle.

SUMMARY

The subject matter described herein relates to an electrical system for a step through two wheeled vehicle that also provides the means for effective cooling of the battery pack.

According to one aspect of the present subject matter, a step through two wheeled vehicle includes a footboard and a frame. The frame is extending longitudinally along the two wheeled vehicle. The two wheeled vehicle is provided with an electrical system underneath the footboard of the two wheeled vehicle. The electrical system comprises a plurality of battery packs. A plurality of temperature sensors are provided in the electrical system for sensing the temperature of each of the battery packs. A plurality of blowers is provided for cooling the battery packs. The electrical system further includes a controller to operate the blowers based on their temperature.

A bottom panel covers the electrical system of the electric motor driven two wheeled vehicle. The bottom panel has a plurality of louvers provided for directing air flow to the battery packs. .

These and other features, aspects, and advantages of the present subject matter will become better understood with reference to the following description and appended claims. This summary is provided to introduce a selection of concepts in a simplified form. This summary is not intended to identify key features or essential features of the

claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter.

BRIEF DESCRIPTION OF DRAWINGS:

The above and other features, aspects, and advantages of the subject matter will become better understood with regard to the following description, appended claims, and accompanying drawings where:

Fig.1 illustrates the perspective view of the scooter with respect to one embodiment of the present subject matter.

Fig.2 illustrates the position of battery packs below the footboard area of the scooter of **Fig.1**.

Fig.3 illustrates the side view of the electrical system of the scooter shown in **Fig.1**.

Fig.4 illustrates the arrangement of louvers on the bottom panel along the G-G axis, D-D axis and H-H axis of the scooter shown in Fig.1.

Fig.5 illustrates the arrangement of first louver on the bottom panel along the G-G axis of the scooter shown in **Fig.1**.

Fig.6 illustrates the arrangement of second louver on the bottom panel along the D-D axis of the scooter shown in **Fig.1**.

Fig.7 illustrates the arrangement of third louver on the bottom panel along the H-H axis of the scooter shown in **Fig.1**.

Fig.8 illustrates the electrical system of the scooter of the scooter shown in **Fig.1**.

Fig.9 illustrates the block diagram of the operation of the controller of the scooter shown in **Fig.1**.

DESCRIPTION

An electrical system positioned underneath the footboard allows effective utilization of available space and for cooling the battery pack is described. The electrical system is placed beneath the frame of the two wheeled vehicle. The frame extends longitudinally along the two wheeled vehicle further includes a footboard attached to the frame.

The electrical system includes one or more battery packs, temperature sensors, blowers and a controller. The temperature sensors measure the temperature of the battery packs. Each of the temperature sensors can be mounted on each of the battery pack. The blowers are provided in the front portion of the battery packs and are attached to the frame of the two wheeled vehicle. The controller regulates the operation of the blowers based on the temperature of the battery packs measured by the temperature sensors.

The electrical system of the two wheeled vehicle is covered by a bottom panel of the two wheeled vehicle. The bottom panel includes a plurality of louvers for allowing the entry of air. The louvers are placed angularly on the bottom panel to allow the entry of air when the two wheeled vehicle is in motion and thus provides natural cooling to the battery pack.

A step through two-wheeled vehicle comprises a frame that extends longitudinally along the two wheeled vehicle. The vehicle further include a footboard extending downwardly and longitudinally of the frame, an electrical system that is provided underneath the footboard and a bottom panel for covering the electrical system. The bottom panel has a plurality of louvers that are provided on the surface of the bottom panel in order to allow entry of air through louvers. The electrical system includes a plurality of battery packs, a plurality of temperature sensors, a plurality of blowers and a controller. Each temperature sensor senses the temperature of each one of corresponding battery packs. Blowers are provided in the forward portion of battery packs and provide a movement of cooling air towards each of battery packs respectively. The controller selectively operates blowers based on an output from the temperature sensors.

In accordance with one aspect of the present subject matter, the footboard is attached to the frame.

In accordance with another aspect of the present subject matter, the louvers are placed at an angle of 45 degree with respect to the bottom panel.

In accordance with another aspect of the present subject matter, each blower is attached to the frame separately.

In accordance with another aspect of the present subject matter, the temperature sensors and the blowers are connected to the controller through a plurality of connectors.

In accordance with another aspect of the present subject matter, the output of temperature sensor is 40 degrees Celsius.

Fig.1 illustrates a perspective view of a scooter with respect to one embodiment of the present subject matter. The embodiments disclosed herein are described in the context of a scooter. However, the embodiments and the subject matter herein can also be applied to other vehicles, such as motorcycle type two or three-wheeled vehicles, all terrain vehicles, and other vehicles with more than two wheels.

As used herein, the terms "front", "rear", "left", "right", "up", and "down", correspond to the direction assumed by a driver of the vehicle. The scooter **100** is configured for accommodating two persons, a rider and a pillion. The scooter **100** includes a frame **105**, a seat **110**, a front wheel **115**, a rear wheel **120**, a footboard **125**, an electric motor and a transmission means to turn the wheels of the scooter **100**. The scooter **100** further includes an electrical system **130** disposed underneath the footboard **125** of the scooter **100**.

The terms 'scooter' and 'two wheeled vehicle' are hereinafter interchangeably used.

Fig.2 illustrates the position of battery packs below the footboard area. As shown, the chassis tubes **205**, **210** and **215** are disposed between the footboard **125** of the scooter **100** and a bottom panel **220**. The battery packs **225**, **230**, and **235** are placed between the chassis tubes **205**, **210** and **215** below the footboard **125** area of the scooter **100**. Each of the battery packs **225**, **230** and **235** has a mounted temperature sensor **240**, **245** and **250** respectively for measuring their related temperature.

Fig.3 illustrates the side view of the electrical system. A plurality of louvers **305** are provided on the surface of the bottom panel **220** of the scooter **100**. The plurality of louvers **305** allow entry of air within the electrical system **130** to provide natural cooling of each of the battery pack **225**, **230** and **235** when the scooter **100** is in running condition.

Fig.4 illustrates the arrangement of louvers on the bottom panel along the G-G axis, D-D axis and H-H axis. As shown in figure 4, three set of louvers (collectively referred to as louvers **305**) are provided on the surface of bottom panel **220** of the scooter **100**. The louvers **305** are preferably placed at an angle of 45 degree with respect to the bottom panel **220** of the scooter **100**. The first set of louvers **305/1** is formed on the bottom panel **220** of the scooter **100** along the H-H axis. The second set of louvers **305/2** is formed on the bottom panel **220** of the scooter **100** along the D-D axis. The third set of louvers **305/3** is formed on the bottom panel **220** of the scooter **100** along the G-G axis. The louvers **305** allow the entry of air to provide natural cooling of the battery packs **225**, **230** and **235** when the scooter **100** is in motion. It would be appreciated by a skilled person that the angle of the louver **305** can be changed so as to adjust the rate of air flow to the battery pack **225**, **230** and **235**.

Fig.5 illustrates the arrangement of first louver on the bottom panel along the axis G-G. The first set of louvers **305/1** covers the first battery pack **225** and is formed on the bottom panel **220** of the scooter **100** at an angle of preferably 45 degrees along the axis G-G. The first set of louvers **305/1** allows the entry of air when the scooter **100** is in motion directing the air flow to the first battery pack **225**. The first louver **305/1** can be formed at an angle between 0 to 90 degrees on the surface of the bottom panel **220** of the

scooter **100**. Similarly the second set and the third set of louvers **305/2** and **305/3** are arranged so as to direct the air flow to the second and the third battery packs **230** and **235**. The structure of the second and the third louver **305/2** and **305/3** is depicted in **Fig. 6** and **Fig. 7** respectively.

Fig.8 illustrates the electrical system of the scooter. The first temperature sensor **240**, the second temperature sensor **245**, and the third temperature sensor **250** are connected to a controller **805** by means of connectors **810**.

Blowers **815**, **820**, and **825** are attached to the frame **105** of the scooter **100** and are connected to the controller **805** through connectors **810**. The blowers **815**, **820**, and **825** are provided in the forward portion of the battery packs **225**, **230**, and **235** respectively to provide a forced movement of cooling air.

The temperature sensors **240**, **245**, and **250** measures the temperature of the first battery packs **225**, **230**, and **235** respectively. Based on the temperature of the battery packs **225**, **230**, and **235** the controller **805** operates one or more of the blowers **815**, **820** or **825**.

Fig.9 illustrates the block diagram of the operation of the controller. The block diagram illustrates the circuitry to operate the first blower **815**, the second blower **820**, and the third blower **825**. The circuitry includes a thermistor **905** comprising a first temperature sensor **240**, the second temperature sensor **245**, and the third temperature sensor **250** to measure the temperature of the first battery pack **225**, the second battery pack **230**, and the third battery pack **235**. The current output of the thermistor **905** is given to a signal conditioner **910**. The signal conditioner **910** filters the electrical noises

from the output signal of the thermistor **905** and the filtered output is given to a comparator **915**. The comparator **915** compares the output of thermistor **905** with a threshold value. When the output of thermistor **905** exceeds the threshold value, the comparator **915** triggers the electrical switch **920** and thus operate the blower **925** comprising the first blower **815**, the second blower **820** and the third blower **825**. The first blower **815**, the second blower **820**, and the third blower **825** will therefore provide the movement of cooling air to the first battery pack **225**, the second battery pack **230**, and the third battery pack **235** respectively. In the present embodiment, the predetermined threshold value is 40 degree Celsius.

The subject matter described herein is not limited to motor driven scooter type vehicle. Rather, the subject matter described herein can be applied to any other vehicle using any other power source, and more particularly to small wheeled vehicles like motorcycles.

Although the subject matter has been described in considerable detail with reference to certain preferred embodiments thereof, other embodiments are possible. As such, the spirit and scope of the appended claims should not be limited to the description of the preferred embodiment contained therein

We Claim:

1. A step through two-wheeled vehicle **100**, said two wheeled vehicle **100** comprising:

a frame **105** extending longitudinally along said two wheeled vehicle **100**;

a footboard **125** extending downwardly and longitudinally of said frame **105**,

an electrical system **130** provided underneath said footboard **125**;

a bottom panel **220** for covering said electrical system **130**, wherein said bottom panel **220** has a plurality of louvers (**305/1**, **305/2** and **305/3**) provided on the surface of said bottom panel **220** allowing entry of air through said louvers (**305/1**, **305/2** and **305/3**);

said electrical system **130** comprises:

a plurality of battery packs (**225**, **230** and **235**);

a plurality of temperature sensors (**240**, **245** and **250**) wherein each of said temperature sensor (**240**, **245** and **250**) is sensing the temperature of each of said battery packs **225**, **230** and **235** respectively;

a plurality of blowers (**815**, **820** and **825**) provided in the forward portion of said battery packs **225**, **230** and **235**, wherein each of said blowers (**815**, **820** and **825**) provide a movement of cooling air towards each of said battery packs (**225**, **230** and **235**) respectively;

a controller **805**, wherein said controller **805** selectively operates said blowers (**815**, **820** and **825**) based on an output from said temperature sensors (**240**, **245** and **250**).

2. The two wheeled vehicle **100** as claimed in claim 1, wherein said footboard **125** is attached to said frame **105**.
3. The two wheeled vehicle **100** as claimed in claim 1, wherein said louvers (**305/1**, **305/2** and **305/3**) are placed at an angle of 45 degree with respect to the bottom panel **220**.
4. The two wheeled vehicle **100** as claimed in claim 1, wherein each of said blowers (**815**, **820** and **825**) are attached to said frame **105.**
5. The two wheeled vehicle **100** as claimed in claim 1, wherein said temperature sensors (**240**, **245** and **250**) and said blowers (**815**, **820** and **825**) are connected to said controller **805** through a plurality of connectors **810**.
6. The two wheeled vehicle **100** as claimed in claim 1, wherein said output of temperature sensors (240, 245 and 250) is 40 degrees Celsius.

100

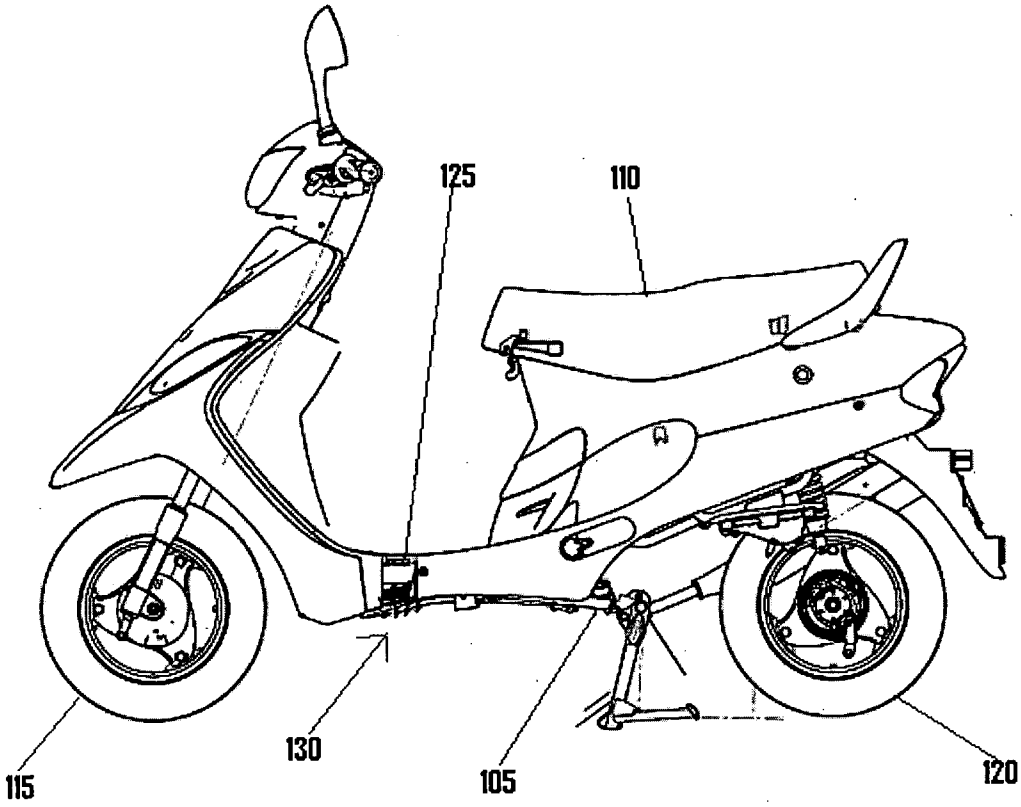


Fig.1

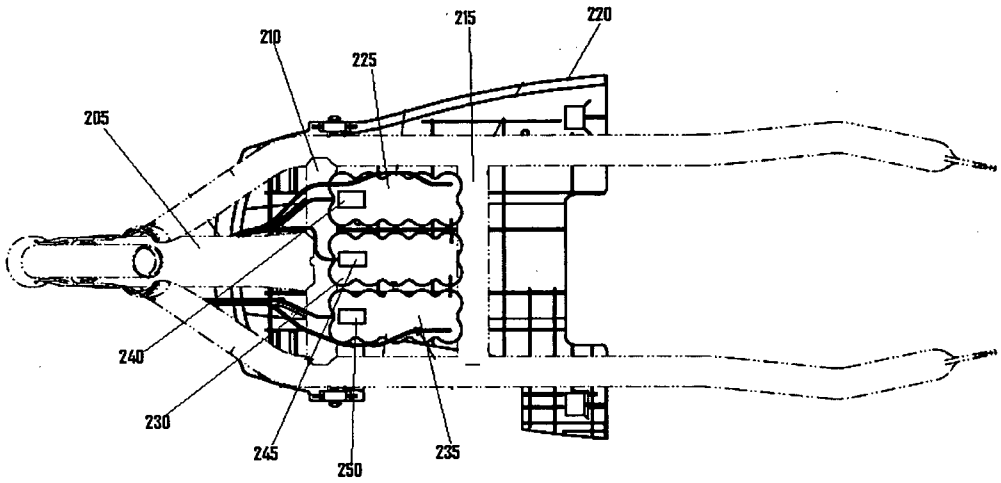


Fig.2

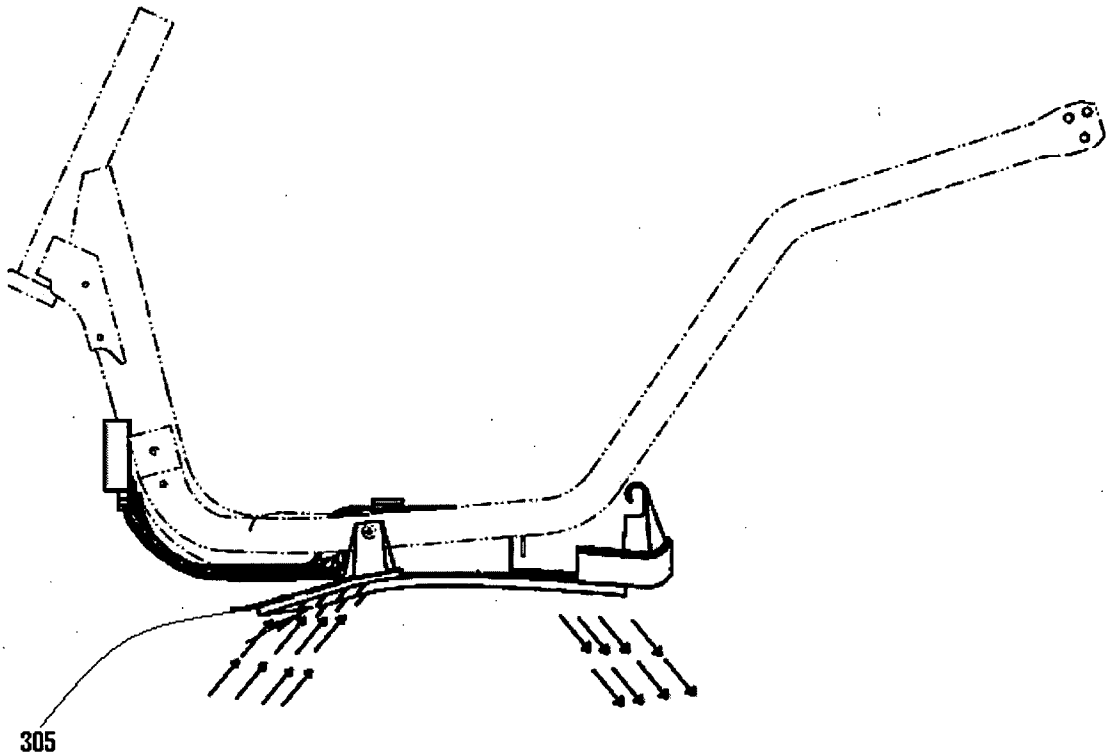


Fig.3

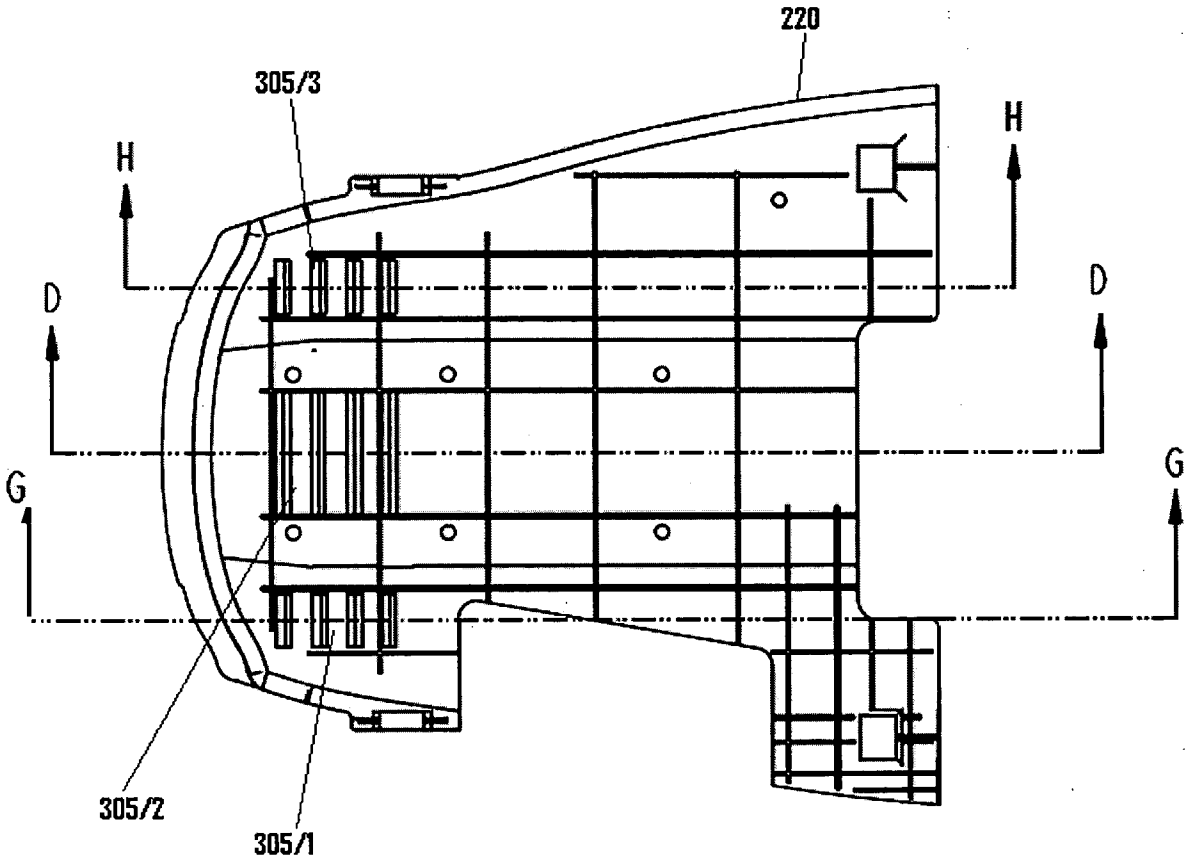


Fig.4

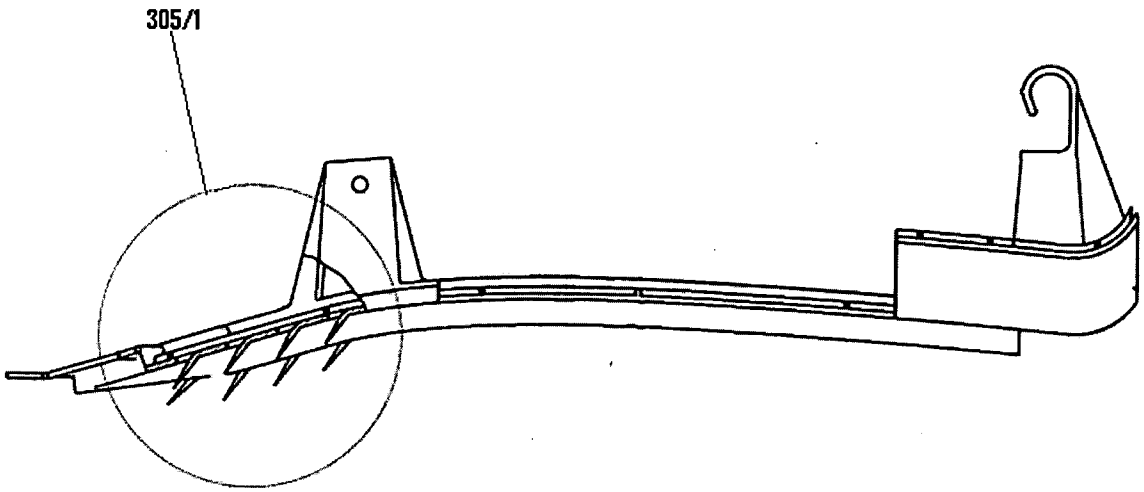


Fig.5

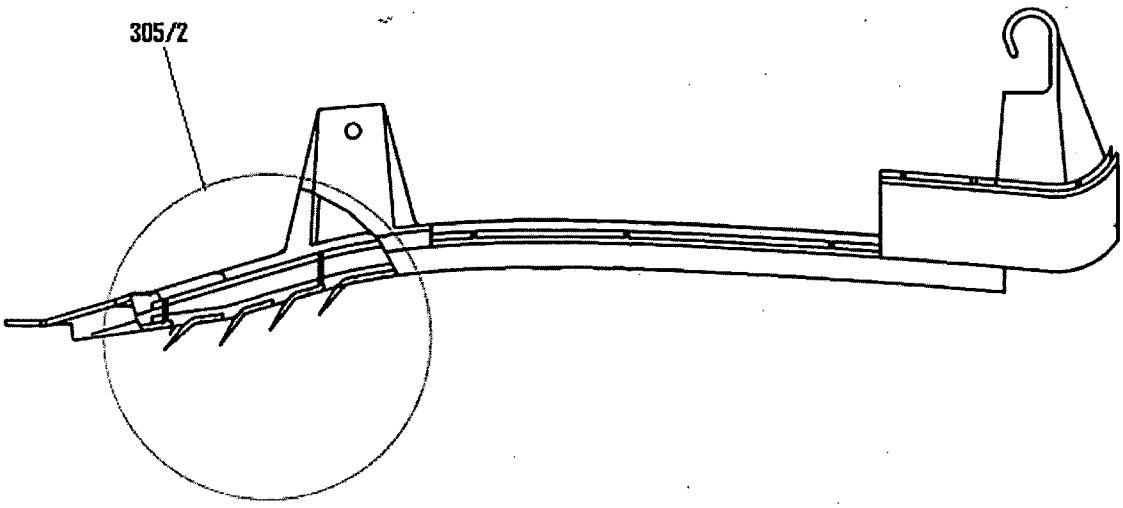


Fig.6

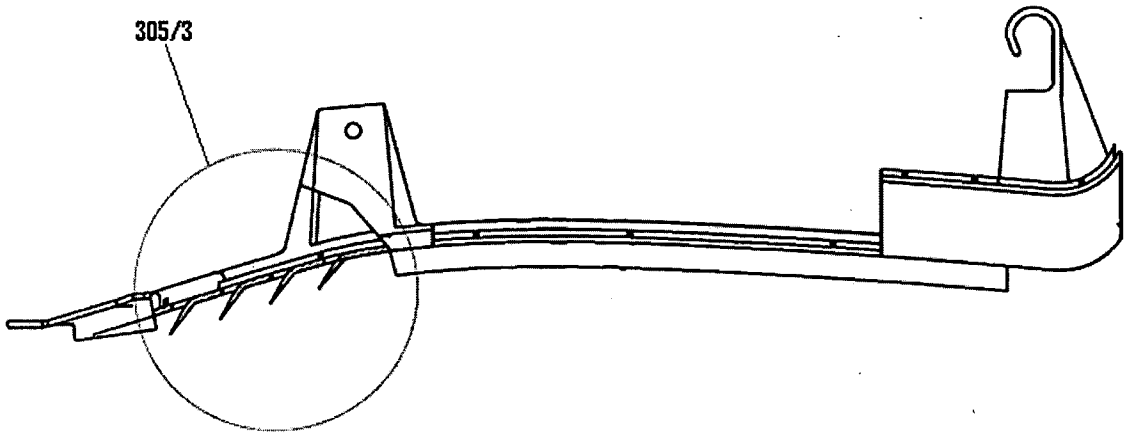


Fig.7

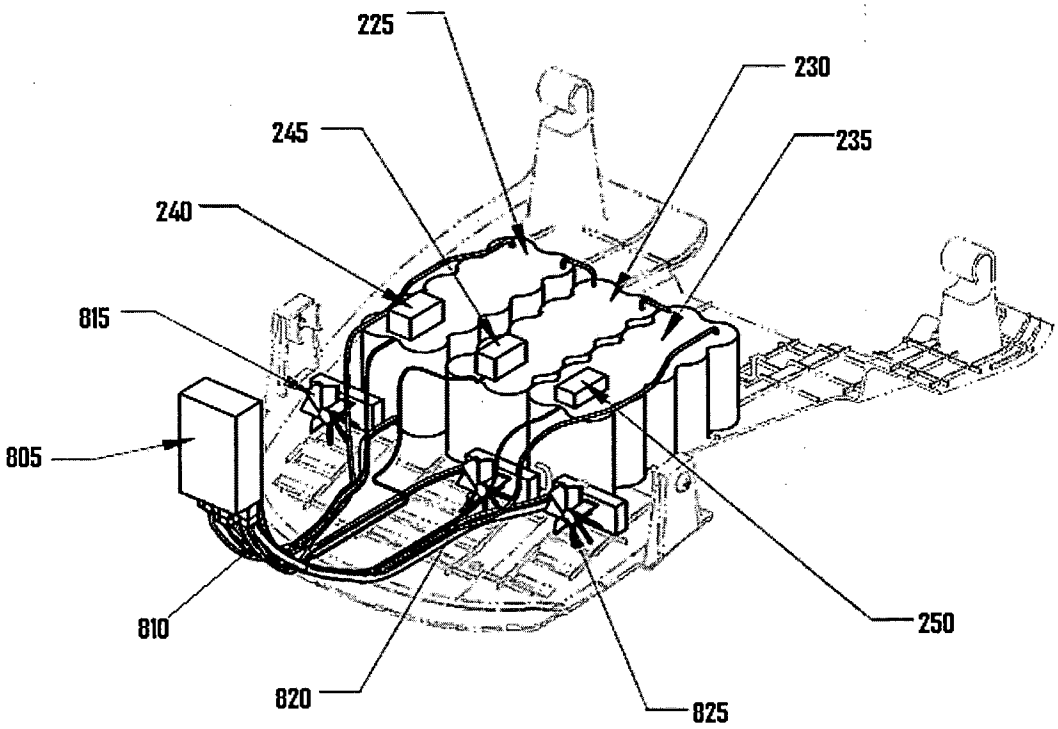


Fig.8

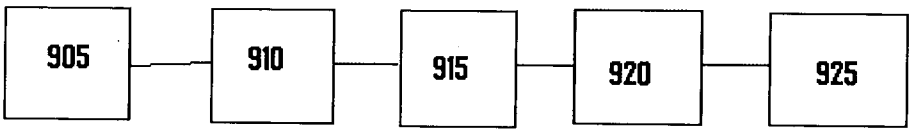


Fig.9

INTERNATIONAL SEARCH REPORT

International application No
PCT/IN2008/000207

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01M10/50

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)
H01M

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 practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2005 093144 A (TOKYO R & D KK) 7 April 2005 (2005-04-07) figures 3-5	1-6
X	JP 10 297570 A (YAMAHA MOTOR CO LTD) 10 November 1998 (1998-11-10) abstract	1-6

☐ 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	Date of mailing of the international search report
11 September 2008	22/09/2008

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Cappadonia, Marcella

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IN2008/000207

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2005093144 A	07-04-2005	NONE	
JP 10297570 A	10-11-1998	JP 3660466 B2	15-06-2005