

SYSTEM FOR COOLING AN ELECTRICAL BATTERY, AND BATTERY INCLUDING SUCH A SYSTEM

5 The present invention relates to a system for cooling an electrical battery designed to be fitted to a land, marine or arial vehicle.

 In order to satisfy the objectives of reducing emissions, motor-vehicle manufacturers have been steered toward vehicles of the all-
10 electrical type or of the hybrid-electrical type combining the use of one or two electrical machines and of an internal combustion heat engine. These electrical machines are powered by power batteries such as battery packs comprising several unitary cells. As an example, lithium-ion batteries are particularly widely approved in the electrical-vehicle or hybrid applications
15 because of their high specific energies which help to increase the range of the vehicles.

 "Unitary cells" are understood to be an electrochemical element contained in an individual covering furnished with a positive electrode and a negative electrode.

20 "Battery pack" is understood to be a set comprising several permanently electrically connected unitary cells, the terminals, the covering and the marking.

 These cells heat up in operation depending on the conditions of use and it is known practice to fit these batteries with a cooling installation
25 using a flow of air or liquid circulating all around the unitary cell in order to cool the cells.

 Such a cooling solution is not optimal in terms of bulk. Specifically, it is necessary to maintain a sufficient spacing between cells for the circulation of the coolant around the cells. However, the manufacturers of
30 electrical or hybrid vehicles require more compact electrical batteries while having sufficient power to cover the increasing demands in electricity on board the vehicles associated with the numerous functions (braking assistance, electrical steering, etc.) that these vehicles may offer. Specifically, the batteries are subjected to considerable space limitations
35 because of the presence of numerous mechanical or electrical members under the hood or on the chassis of the vehicles.

 Another problem encountered in this type of cooling solution is due to the fact that the fluid does not circulate evenly in the spacings, causing

poor cooling of the cells, which could in time lead to a malfunction of the battery associated with losses of integrity of certain cells.

Another problem encountered in the current cooling solution is associated with pollution by the air over all of the contact surfaces.

5 Moreover, in the situation in which water is used as coolant, a possible water leakage in the circuits could easily damage the cells.

It would therefore be worthwhile to have a cooling system capable of cooling a battery comprising a set of cells contained in a casing of which the cooling mechanism is optimized relative to the arrangement of cells,
10 without the problems found with the cooling device of the prior art.

Moreover, it is known that the batteries are subjected to multiple stresses such as considerable variations in temperature, mechanical forces and external attacks from various sources, notably by the external water.

Since lithium-ion cells in prismatic casings with thin metal walls are
15 fragile elements, malfunctions of this type of battery associated with losses of integrity of at least certain of these cells are often observed. These losses of integrity of the cells result notably from the external stresses being applied to the box housing.

Moreover, in order to ensure the powering of the electrical motor but
20 also to cover the increasing demands in electricity on board the vehicles associated with the numerous functions (braking assistance, electrical steering, etc.) that these vehicles may offer, the batteries are of greater or lesser size depending on the equipment chosen but in all cases greater than conventional batteries.

25 However, it is known that the batteries are subjected to considerable space limitations because of the presence of numerous mechanical and/or electrical members under the hood or on the chassis of the vehicles.

The objective of the present invention is therefore to propose a
30 cooling system designed to cool a battery comprising at least one arrangement of cells contained in a casing that is simple in its design and in its operating mode, economical and making it possible to effectively and evenly cool the cells while significantly reducing the volume of the battery, this compact electrical battery being capable of providing energy densities
35 as great as the batteries of the prior art.

A further subject of the present invention is an electrical battery that is simple in its design and in its operating mode, economical and making it

possible to preserve the integrity and the service life of the energy-generating cells that it comprises.

An additional subject of the present invention is an electrical battery making it possible to vary the number of energy-generating cells depending
5 on the capacity requirements demanded by the motorized machines.

Accordingly, the invention relates to a system for cooling an electrical battery comprising a casing and at least one longitudinal arrangement of energy-generating cells placed in said casing.

According to the invention, said system comprises:

- 10 - at least one electrically insulating and thermally conductive layer which thermally connects the cells of said at least one arrangement with one and the same heat-dissipation surface placed in said casing in order to ensure a uniform discharge of the thermal energy generated by each of the cells to said surface, and
- 15 - cooling means designed to cool said surface.

The system of the invention uses one of the walls of the covering of the unitary cells as a conductor of heat in order to cause the heat to be discharged to a single point that, in this instance, consists of one and the same heat-dissipation surface placed in the casing by means of a thermally
20 conductive and electrically insulating layer. This makes it possible to uniformly cool all of the cells. Moreover, it makes it possible to reduce the bulk of the battery. Specifically, it is no longer necessary to leave sufficient space for the coolant to circulate.

The heat originating from the cells is discharged uniformly to this
25 surface of the battery casing. This surface which is usually made up of a plate can therefore be easily cooled by cooling means.

The battery casing and the covering of the cells are made in a thermally conductive material such as aluminum.

According to one embodiment of the invention, this system also
30 comprises a compression means exerting on said cells a compression along or substantially along the longitudinal axis of the arrangement such that the cells of said arrangement are pressed against one another, this compression placing the cells thermally in contact with one another such that said at least one arrangement of cells forms a single uniform block.

35 This embodiment makes it possible to further reduce the bulk of the cells by entirely removing the spacings while improving the discharge of heat by causing the lateral walls of the covering of the cells to participate.

Preferably, said compression means comprises at least two compression plates, two of said plates being placed each at the ends of said at least one corresponding longitudinal arrangement of cells.

5 Preferably, one of said compression plates forms an integral part of said casing.

According to one embodiment of the invention, said heat-dissipation surface consists of the bottom of said casing thermally placed in contact with the base of each of cells of said at least one arrangement by means of said at least one electrically insulating and thermally conductive layer.

10 According to another embodiment of the invention, said battery comprising a single longitudinal arrangement placed in said casing, said heat-dissipation surface consists of one of the two lateral walls of said casing placed thermally in contact with the sides of the cells by means of at least one electrically insulating and thermally conductive layer.

15 Preferably, this system also comprises at least one intermediate thermally conductive plate placed between two consecutive cells in order to increase the surface area of thermal exchange.

20 Preferably, said at least one plate having an L-shaped profile, the two faces of said at least one plate are in thermal contact with the adjacent faces of the two cells and the base and the side of one of the two cells in contact with the base of said plate by means of an electrically insulating and thermally conductive layer.

25 The addition of the intermediate plates makes it possible to facilitate and increase the discharge of heat by the convection phenomenon. These plates may be made of an aluminum or graphite or any other thermally conductive material.

30 Preferably, said layer or layers consists or consist of a thermal gel allowing a uniform and homogeneous application over the internal surface of the bottom and on the base of the plates. The air is expelled by virtue of the squashing of the gel due to the weight of the cells.

Preferably, said cooling means comprise at least one connection between the bottom of the casing and a mass so as to create a path for discharging the thermal energy stored by the bottom to said mass.

35 Alternatively or in addition, said cooling means comprise a fluid-based cooling device installed close to the casing or a cooling device of the phase-change type.

As an illustration, this cooling device of the phase-change type comprises one or more Peltier-effect modules.

Preferably, said cooling device is a coolant-circuit device.

Preferably, said cooling device is a ventilation device.

The invention also relates to an electrical battery comprising a casing and a set of energy-generating cells.

5 According to the invention,

- said battery comprises at least one longitudinal arrangement formed by at least certain of said cells, the cells of said arrangement being pressed against one another while being held secured together by a compression means exerting on said cells a compression along or
- 10 substantially along the longitudinal axis of the arrangement,
- said longitudinal arrangement being attached to said casing by means of said compression means, which is at least partly attached to said casing by attachment members and
- said battery comprises a cooling system, this cooling system
- 15 comprising at least one electrically insulating and thermally conductive layer which thermally connects at least the cells of said at least one longitudinal arrangement with one and the same heat-dissipation surface placed in said casing or formed by at least one of the walls of said casing in order to ensure a uniform discharge of the thermal energy generated by
- 20 each of the cells of said arrangement to said dissipation surface, said layer or at least one of said electrically insulating and thermally conductive layers consisting of a thermal gel.

The energy-generating cells of a longitudinal arrangement are consequently not attached directly to the casing; they are held in position

25 only by means of the compression means of this arrangement which exerts a uniform compression on these cells, said compression means of this arrangement being secured to the casing of the battery.

These energy-generating cells are, for example, cells of the metal sodium chloride type such as ZEBRA (Na-NiCl_2) cells, Ni/MH cells, lithium

30 polymer cells, lithium phosphate cells or else lithium-ion cells.

These energy-generating cells advantageously have a metal prismatic casing which comprises a large base providing a considerable thermal-exchange surface with said at least one electrically insulating and thermally conductive layer.

35 Moreover, the thermal gel advantageously makes it possible to provide an immobilization of the cells of the arrangement on the wall of the casing when the heat-dissipation surface is formed by one of the walls of the battery casing, for example its bottom plate. This immobilization makes

it possible to compensate, on the one hand, for the possible surface irregularities of the wall of the battery casing and, on the other hand, to absorb the alignment differences of the cells held in compression by the end plates in the longitudinal arrangement.

5 Advantageously, the arrangements of the present battery make it easier to install and handle the electrical batteries that are fitted therewith, these arrangements being able to be more easily manipulated than the batteries of the prior art. Moreover, these arrangements allow a pre-installation of the battery, including connection systems between cells and
10 measurement wiring harnesses.

 In various particular embodiments of this electrical battery, each having its particular advantages and being capable of various possible technical combinations:

 - the thermal gel forming said at least one electrically insulating
15 and thermally conductive layer has a thermal conductivity equal to or greater than 0.7 W/m.K, and even better, equal to or greater than 3 W/m.K. This thermal gel can be produced on the basis of a particle-laden silicone gel. Purely by way of illustration, it is a ceramic-particle-laden silicone gel.

 - the thermal gel forming said at least one electrically insulating
20 and thermally conductive layer is at least partially polymerized or not polymerized,

 - said compression means are configured such that said cells of said at least one arrangement are set back from said heat-dissipation surface, said at least one electrically insulating and thermally conductive
25 layer formed of a thermal gel being placed at least partially between said cells and said heat-dissipation surface,

 - at least certain of said cells of at least one longitudinal arrangement comprise an electrically insulating and thermally conductive layer consisting of a hardened thermal gel, said layer being pressed
30 against one of their walls while being held in position by at least one retaining element,

 - said retaining element is formed from a heat-shrinkable film, this film covering only the periphery of said electrically insulating and thermally conductive layer,

35 - this battery comprising at least two longitudinal arrangements; it comprises one compression means for each of these arrangements,

 - said compression means is/are adjustable to reduce or increase the longitudinal dimension of said arrangement(s),

- said compression means each comprise at least two compression plates, two of said plates being placed at the ends of said corresponding longitudinal arrangement(s).

5 These longitudinal arrangements may be placed horizontally or vertically in the casing, the bottom of the casing then being flat or substantially flat.

- said at least one arrangement being placed horizontally in said casing, said plates are configured such that only said plates of said at least one arrangement are in contact with the bottom of the casing, said cells being set back from the upper and lower ends of said plates so that only
10 said plates transmit the forces being applied in the upper portion of the battery to the bottom of said casing.

Advantageously this prevents applying mechanical pressure to the energy-generating cells of the battery, the stresses being exerted in the upper portion of the battery being transmitted directly to the bottom of the casing
15 by the plates.

This geometry of each longitudinal arrangement makes it possible not only to protect the energy-generating cells but also their connection systems.

- at least one of said compression plates can be moved in said casing.
20 Purely as an illustration, said compression plate comprises lugs laterally allowing a translational movement of this plate along guide rails placed on at least a portion of the bottom of the casing. This plate also comprises locking members.

Alternatively, since the compression plates are connected together by tie-
25 rods, these tie-rods are adjustable lengthwise in order to allow a movement of the movable compression plate. As an example, these tie-rods are telescopic tie-rods.

- one of said compression plates forms an integral part of said casing.

30 Said compression plate is for example a wall of said casing.

- said compression means also comprises or comprise at least one intermediate plate placed between two energy-generating cells in order to provide a uniform compression of said generating cells of said corresponding longitudinal arrangement(s),

35 - said plates are connected together by at least tie-rods,
- said arrangements being placed side by side, at least certain of these plates comprise cutouts to ensure the interaction of the latter for the purpose of reducing their bulk.

It is therefore possible to interlock the compression plates of arrangements placed side by side in order to reduce the bulk of the set thus formed. Moreover, this interlocking makes it possible to create a cohesion between the arrangements improving the mechanical structure.

5 - said cutouts allow an alignment or substantially an alignment of the tie-rods of two consecutive arrangements thus placed side by side.

As an illustration, for longitudinal arrangements placed flat on the bottom of the battery casing, this innovative geometry of the arrangements makes it possible to superpose the tie-rods of two consecutive arrangements so as
10 to reduce the bulk of these arrangements placed side by side. It is therefore possible to have a compact electrical battery.

- at least one electrically insulating and thermally conductive plate is interposed between two consecutive energy-generating cells of at least one arrangement.

15 Preferably, these insulating plates are incompressible plates.

As an illustration, they can be made of glass fibers.

Very advantageously, the thickness of this insulating plate is less than or equal to 1 mm, and even better 0.5 mm so as not to compromise the compactness of the electrical battery.

20 - insulating cross-braces are interposed between the arrangements.

The invention also relates to a motorized vehicle fitted with at least one battery as defined above.

Preferably, said mass consists of the chassis of said vehicle which acts as
25 a veritable radiator in order to cause the heat stored in the heat-dissipation surface of the casing to be dissipated.

This motorized machine may be a vehicle of the all-electrical type or of the hybrid type. This vehicle may be a vehicle for transporting people and/or goods, a worksite machine, a marine vehicle or else an aircraft.

30 This vehicle may be fitted with wheels, tracks or else a combination of these elements.

The invention will be described in greater detail with reference to the appended drawings in which:

- figure 1 shows schematically a side view of a longitudinal
35 arrangement of an electrical battery furnished with a cooling system according to a first particular embodiment of the invention;

- figure 2 shows schematically a view in perspective of two longitudinal arrangements placed side by side of an electrical battery furnished with compression means;
 - figure 3 shows schematically a front view of two longitudinal
5 arrangements placed side by side furnished with a cooling system according to a variant of the first particular embodiment of the invention;
 - figure 4 shows a front view of a plurality of longitudinal arrangements furnished with a cooling system according to the embodiment of figure 3;
 - 10 - figure 5 shows schematically a side view of a longitudinal arrangement of an electrical battery furnished with a cooling system according to a second particular embodiment of the invention;
 - figure 6 shows a view from above of a longitudinal arrangement furnished with a cooling system according to a variant of the second
15 embodiment of figure 5;
 - figure 7 is a partial view in perspective of an electrical battery according to a third embodiment of the invention, the lateral walls and the upper wall of this battery having been omitted for the purpose of clarity.
- 20 Figure 1 shows an electrical battery 1. The concept of electrical battery is understood in the present invention to cover any device forming a rechargeable reservoir of electrical energy.
- This electrical battery comprises a casing made of a metal such as steel or aluminum. This casing has a generally parallelepipedal shape provided
25 usually with a bottom 12 and lateral walls 14. It is usually divided into two compartments. One of the two compartments comprises a battery pack and the other a set of electronic circuits. The battery pack is formed of a plurality of energy-generating cells 2 which in this instance, for example, are lithium-ion cells in a prismatic casing.
- 30 In figure 1, the cells 2 are distributed in a column or longitudinal arrangement, being aligned parallel to one another.
- Preferably, these cells are elongate and placed vertically in the casing with their large dimension oriented parallel to the lateral walls of the casing. But they may also be placed lying down with their large dimension oriented
35 parallel to the bottom of the casing. Each of the cells is furnished with a positive terminal 2A and a negative terminal 2B.
- The cells are each contained in a covering which is made of a thermally conductive material such as aluminum. This covering is usually furnished

with a base 16 and sides 15. During the operation of the battery, these cells heat up, so it is necessary to cool these cells so as to keep the cells at an optimal operating temperature, or at least between two acceptable temperature limits.

5 Figure 1 shows a cooling system according to a first embodiment of the invention. This system is implemented by an electrically insulating and thermally conductive layer 8 interposed between the base 16 of the covering of each of the cells 2 and the internal surface of the bottom 12 of the battery pack compartment. This layer 8 places the base 16 of each of
10 the cells in contact with the bottom 12 in order to discharge in a uniform manner the thermal energy generated by each of the cells toward the bottom. The bottom 12 of the casing thus forms one and the same heat-dissipation surface which stores the thermal energy.

“Internal surface” of said bottom is understood to be the surface of this
15 bottom designed to be placed in contact with the base of the cells contained in the battery.

To cool this heat-dissipation surface which usually takes the form of a plate, it is possible to envisage placing it in direct contact with a mass or a radiator (not shown). As an example, in the case of a motor-vehicle
20 application, the bottom plate is placed in direct contact with the chassis of the vehicle; the heat is then transmitted to the whole of the chassis acting as a veritable radiator.

In order to be able to cool the plate rapidly, it is possible to install a coolant circuit under the bottom (not shown). This fluid may be heat-transferring
25 liquid or air. It is possible to envisage also placing a temperature sensor on the bottom plate. The temperature measurements make it possible to control the cooling device.

The cooling system according to the invention may be implemented for a battery pack in which the cells are spaced apart from one another.

30 In a preferred embodiment of the invention, the cooling system comprises compression means which make it possible to press the cells against one another.

Figure 2 shows an example of a battery pack comprising two columns 3, 4 of cells. The cells 2 of each column are held together by two compression
35 plates 5, 6 placed at the ends of the corresponding column 3, 4. The compression plates 5, 6 of each column exert on the cells 2 of the column 3, 4 a compression along the longitudinal axis of this column.

Tie-rods 7 are used to connect the compression plates 5, 6 together in each column. These tie-rods 7 ensure the adjustment of the compression of the energy-generating cells 2.

5 The number of tie-rods 7 connecting the compression plates 5, 6 of each column can be varied according to their position, in order to obtain a uniform compression over the whole surface of each energy-generating cell 2. The positions of the tie-rods then being adapted to maintain a good uniformity of compression.

10 Each of the two columns 3, 4 is attached to the casing by means of the compression plates 5, 6. One of the compression plates placed at the ends of each column being fixed, the other is made movable in order to make it possible to absorb the variations in length of the columns as a result of adjusting the compression of the energy-generating cells 2.

15 In this longitudinal arrangement, once compressed, an adhesion is then created between each element of the column thus producing a rigid block.

Thus, by aligning the cells 2 in the form of a column 3, 4 and by using this compression, the sides of the coverings of the unitary cells are used to conduct the heat to the bottom plate of the casing 12 by means of the thermally conductive layer 8. This increases the surface area of thermal exchange. Also the fact of pressing the cells against one another makes it possible to significantly reduce the bulk of the battery pack.

20 In order to further increase the thermal exchange by convection, intermediate plates are placed between two consecutive cells. Figure 3 shows an example of this plate 9 having an L-shaped profile. But it is also possible to envisage a plate having an I-shaped or H-shaped profile oriented horizontally.

25 In figure 3, the two faces 9A, 9B of the branch L are in contact with the adjacent faces of the two cells. The base 16 of the two cells is in contact with the base 9C of the plate by means of an electrically insulating and thermally conductive layer 10 in order to prevent the presence of any air gap. The base 9C of the L-shaped plate is then placed in contact thermally with the bottom of the casing 12 by means of an electrically insulating and thermally conductive layer 8.

30 The plate 9 is made of a thermally conductive material such as graphite or aluminum.

Preferably, these layers 8, 10 are formed of a thermal gel or thermal paste which allows a uniform and homogeneous deposit on the surface of the bottom 12 and on the base 9C of the plate.

As shown in figure 4, the cooling system according to the invention can be easily implemented for a battery pack comprising a plurality of columns of cells 2. In particular, compression plates similar to those that are shown in figure 2 (not shown in figure 4) are placed at the ends of each of the columns in order to press the set of cells against one another. Moreover, as in the embodiment shown in figure 3, intermediate plates 9 are placed between the cells 2 in order to improve the thermal exchange. Thermally conductive layers 10, 8 are interposed respectively between the base 16 of each of the cells 2 and the base 9C of the plates, and between the base of the plates and the bottom of the casing 12. The heat generated by each of the columns is thus transmitted to one and the same heat-dissipation surface which in this instance consists of the bottom of the casing 12.

Figure 5 shows a cooling system according to a second embodiment which can be implemented when the battery comprises a single column of cells. In this battery configuration, the thermally conductive layer 8 thermally connects the sides of each of the cells forming the column with one of the lateral walls of the casing 14 which in this instance forms one and the same heat-dissipation surface.

Figure 6 shows a view from above of this column of cells. As in the first embodiment shown in figures 3 and 4, in order to increase the surface area of thermal exchange, thermally conductive intermediate plates 9 are placed between two cells. Thermally conductive layers 10, 8 are interposed respectively between the side 15 of each of the cells 2 and the base 9C of the plates, and between the base 9C of the plates and the lateral wall of the casing 14. The heat generated by this column is thus transmitted to one and the same heat-dissipation surface which in this instance consists of the lateral wall of the casing 14.

More generally, the columns can be installed in various positions depending on the constraints of integration in the battery housing of the vehicle. The unitary cells 2 may thus be placed upright or lying down, the positions of the tie-rods 7 then being adapted to maintain a good uniformity of compression.

Also added are cross-braces made of insulating material making it possible, on the one hand, to prevent short circuits between the columns 3, 4 but also to produce an additional Z-shaped abutment over the whole length of the columns 3, 4.

Figure 7 is a partial view in perspective of an electrical battery according to a third embodiment of the invention, the lateral walls and the upper wall of

this battery having been omitted for the purposes of clarity. The elements of figure 7 bearing the same references as the elements of figures 1 to 6 represent the same objects, which will not be described again herebelow. This electrical battery comprises three columns 3, 4, 17 which are placed
5 flat on the bottom 18 of this battery, an electrically insulating and thermally conductive layer consisting of a thermal gel (not shown) being placed between these columns 3, 4, 17 and the bottom 18 of the battery.

Between two consecutive columns 3, 4, 17 of this battery, a cross-brace 19 is placed, these cross-braces 19 being placed over the whole length of the
10 columns 3, 4, 17 in order to ensure their complete electrical insulation. Moreover, these unitary cells 2 of a portion of these columns 3, 4, 17 are electrically connected.

CLAIMS

1. An electrical battery comprising a casing (1) and a set of energy-generating cells (2), characterized in that
 - 5 - said battery comprises at least one longitudinal arrangement (3, 4) formed by at least certain of said cells, the cells (2) of said arrangement being pressed against one another while being held secured together by a compression means (5, 6) exerting on said cells (2) a compression along or substantially along the longitudinal axis of the arrangement,
 - 10 - said longitudinal arrangement (3, 4) being attached to said casing (1) by means of said compression means (5, 6), which is at least partly attached to said casing (1) by attachment members and in that
 - said battery comprises a cooling system, this cooling system comprising at least one electrically insulating and thermally conductive
 - 15 layer (8) which thermally connects at least the cells of said at least one longitudinal arrangement with one and the same heat-dissipation surface (12, 14) placed in said casing or formed by at least one of the walls of said casing in order to ensure a uniform discharge of the thermal energy generated by each of the cells of said arrangement to said dissipation
 - 20 surface, said layer or at least one of said electrically insulating and thermally conductive layers (8) consisting of a thermal gel.
2. The battery as claimed in claim 1, characterized in that the thermal gel forming said at least one electrically insulating and thermally conductive
- 25 layer (8) is at least partially polymerized or not polymerized.
3. The battery as claimed in claim 1 or 2, characterized in that said compression means are configured such that said cells (2) of said at least one arrangement are set back from said heat-dissipation surface (12, 14),
- 30 said at least one electrically insulating and thermally conductive layer (8) formed of a thermal gel being placed at least partially between said cells and said heat-dissipation surface.
4. The battery as claimed in one of claims 1 to 3, characterized in that
- 35 at least certain of said cells of at least one longitudinal arrangement comprise an electrically insulating and thermally conductive layer (8) consisting of a hardened thermal gel, said layer being pressed against one of their walls while being held in position by at least one retaining element.

5. The battery as claimed in claim 4, characterized in that said retaining element is formed from a heat-shrinkable film, this film covering only the periphery of said electrically insulating and thermally conductive layer (8).

6. The battery as claimed in any one of claims 1 to 5, characterized in that said cooling system also comprises cooling means designed to cool said heat-dissipation surface (12, 14).

7. The battery as claimed in claim 6, characterized in that said cooling means comprise at least one connection between the heat-dissipation surface (12, 14) and a mass so as to create a path for discharging the thermal energy stored by said surface to said mass.

8. The battery as claimed in claim 6 or 7, characterized in that said cooling means comprise a fluid-based cooling device or a cooling device of the phase-change type.

9. The battery as claimed in claim 8, characterized in that said cooling device is a coolant-circuit device or a ventilation device.

10. The battery as claimed in any one of claims 1 to 9, characterized in that said compression means comprise at least two compression plates (5, 6), two of said plates (5, 6) being placed each at the ends of said at least one corresponding longitudinal arrangement (3, 4) of cells.

11. The battery as claimed in claim 10, characterized in that one of said compression plates forms an integral part of said casing.

12. The battery as claimed in any one of claims 1 to 11, characterized in that said heat-dissipation surface consists of the bottom of said casing (12) thermally placed in contact with the base (16) of each of the cells (2) of said at least one arrangement (3, 4) by means of said at least one electrically insulating and thermally conductive layer (8).

13. The battery as claimed in one of claims 1 to 12, characterized in that it also comprises at least one intermediate electrically insulating and

thermally conductive plate (9) placed between two consecutive cells (2) in order to increase the surface area of thermal exchange.

14. A motorized vehicle fitted with at least one battery (1) as claimed in
5 any one of claims 1 to 13.

15. The vehicle as claimed in claims 7 and 14, characterized in that said mass consists of the chassis of said vehicle.