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(54) **TRANSPORTABLE COLD STORAGE CONTAINER**

TRANSPORTABLER KÜHLBEHÄLTER

RÉCIPIENT DE STOCKAGE FROID TRANSPORTABLE

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EP 3 779 331 B1

Description

BACKGROUND OF THE INVENTION

Technical Field

[0001] The present invention relates to a cold storage container that is transportable and is driven by a battery.

Related Art

[0002] A transportable cold storage container that has a housing capable of accommodating food and the like and can cool the food and the like (containments) accommodated in the housing is commercially available (patent literature 1). In a place where an external power supply is available, the cold storage container described in patent literature 1 cools the containments by driving Peltier elements with the external power supply. At this time, cooling while a battery pack mounted on the cold storage container is charged is possible. In a place where an external power supply is not available, the containments are cooled by using electric power of a charged internal battery to drive the Peltier elements. The Peltier element is a semiconductor element capable of freely performing temperature control such as cooling or heating by a direct current and can generate a temperature difference between both surfaces of the element. By passing a direct current through the Peltier element, heat can be absorbed on the low-temperature side and be generated on the high-temperature side, and the amount of heat to be pumped can be changed by changing the voltage applied to the Peltier element. In addition, because the direction of the heat to be pumped can be changed by only changing the polarity of the current flowing through the Peltier element, the above container can be used not only as a cold storage container but also as a hot storage container, and a cold and hot storage container which is also capable of keeping warm is formed in the technique of patent literature 1.

[0003] FIG. 18 is a diagram showing a configuration of a conventional cold storage container 101. The cold storage container 101 is equipped with a heat exchange mechanism 150 using a Peltier element 151 in a door portion 130 that opens and closes an upper opening of a container portion 110, and is driven by a battery 61 accommodated inside a battery accommodation chamber 120 arranged on the side surface of the container portion 110. Above the left and right sides of the container portion 110, a first grip portion 116 and a second grip portion 117 serving as handles during gripping are formed. The heat exchange mechanism 150 includes: the Peltier element 151 arranged in the door portion 130 and used for cooling the interior, an interior fan 157 arranged on the inner side (inner wall) of the door portion 130 and used for stirring air in the interior, and an outer fan 155 arranged on the outer side (outer wall) of the door portion 130 and used for cooling the Peltier element 151. An outer heat sink 154 is arranged on the outer side of the Peltier element 151.

[Literature of related art]

[Patent literature]

[0004] Patent literature 1: Japanese Patent Laid-Open No. 2017-122521. Another transportable cold storage container is known from JP 20010 165548 A.

SUMMARY

[Problems to be Solved]

[0005] In the transportable cold storage container of patent literature 1, cooling performance of about 20°C with respect to the outside air temperature can be expected, but there is a demand for further cooling performance when the outside air temperature is as high as in summer. In addition, there is a demand that the cold storage container be configured to be as transportable as possible, and that the interior capacity (internal volume) be as large as possible with respect to the limited external volume of the housing.
Furthermore, in order to facilitate movement on a flat ground such as asphalt road surface and the like, two casters are arranged at the bottom, a large synthetic resin handle is arranged on a side surface opposite to the casters, and one side of the container portion is moved while being lifted up with the handle (a caster movement mode). However, because a dedicated handle is arranged, the size of the handle is relatively large and bulky. In particular, it is more advantageous for a user who does not or rarely performs the caster movement that there is no handle.

[0006] The present invention has been made in view of the above background, and an objective thereof is to provide a transportable cold storage container in which cooling performance is improved by arranging two or more Peltier

elements.

Another objective of the present invention is to provide a transportable cold storage container in which power consumption is reduced and cooling efficiency is improved by separately arranging power supplies of Peltier elements and element cooling fans and effectively controlling the Peltier elements and the fans.

Still another objective of the present invention is to provide a transportable cold storage container, in which a caster is arranged at the bottom on one side of a container portion and a third belt attachment portion with a shoulder belt hung thereon is arranged on the other side surface to facilitate transport during a caster mode.

Furthermore, a cold storage container is provided in which a caster is arranged at the bottom on one side of a container portion and not only transport using a shoulder belt but also transport using the caster can be performed.

Another objective of the present invention is to provide a transportable cold storage container which has a belt attachment portion and in which a shoulder belt can be attached, wherein an additional belt attachment portion is arranged and the shoulder belt can also be used as a pulling cord during caster movement.

[Means to Solve Problems]

[0007] Representative features of the inventions disclosed in this application are as follows.

According to the present invention, a transportable cold storage container including: a container portion that defines an interior in which an article is accommodated, a door portion that closes an opening of the container portion, a plurality of Peltier elements that cools the interior, an interior fan that stirs air in the interior, an outer fan for cooling the Peltier elements, and a control unit that controls the Peltier elements; the transportable cold storage container capable of being driven by a battery being attachable/detachable; wherein the Peltier elements are driven by a first power supply unit, the interior fan and the outer fan are driven by a second power supply unit, and the first power supply unit and the second power supply unit are controlled independently of each other and an output voltage of the first power supply unit or a voltage applied to the Peltier elements is configured to be changeable.

[0008] In addition, the second power supply unit is configured by two independent power supply units, and the interior fan and the outer fan are also driven independently. A plurality of Peltier elements is arranged and is connected in parallel to a common power supply unit.

According to another feature of the present invention, two Peltier elements are disposed in the door portion, one heat conductor and an inner fin that are in common contact with an inner surface side of the two Peltier elements are arranged, the interior fan is arranged to be adjacent to the inner fin; an outer fin (an outer heat sink) that is in common contact with an outer surface side of the two Peltier elements is arranged, and the outer fan is arranged to be adjacent to the outer fin. In addition, the Peltier elements and the heat conductor are disposed in a region that is equal to or less than half of the area of the door portion facing the opening in a top view. The Peltier element has a quadrangular shape in a top view and an electric wire is drawn out from the vicinity of a corner of one side of the quadrilateral, and the two Peltier elements are disposed in parallel so that the drawing directions of the electric wires are opposite to each other. One side of the Peltier element from which the electric wire is drawn is respectively disposed to be close to the long side of the door portion.

[0009] According to still another feature of the present invention, in order to set the temperature of the interior to a target value, a first driving voltage being a rated voltage of the Peltier elements or close to the rated voltage and a second driving voltage lower than the first driving voltage are used, and temperature control for the interior is performed while switching between a first state in which the first driving voltage is applied to the Peltier elements, a second state in which the second driving voltage is applied to the Peltier elements and a third state in which no voltage is applied to the Peltier elements and the Peltier elements stop driving. In addition, an external power supply part is included in addition to the electric power supply using a battery, and the Peltier elements are driven by a driving rate of 100% when electric power is supplied from the external power supply. Furthermore, even when the Peltier elements is lowered to the second driving voltage in order to keep the temperature of the interior at the target value, the driving of the interior fan and the outer fan is kept constant. According to still another feature of the present invention, two Peltier elements are arranged in a transportable cold storage container and are connected in parallel to a common power supply unit. A temperature sensor that detects the temperature of the interior is arranged, and the control unit independently controls energization or cutoff of the two Peltier elements based on an output from the temperature sensor. The container portion has an opening at the upper surface, and the door portion is a swing type door portion being horizontal in a closed state and has a substantially rectangular shape in a top view. Two Peltier elements are disposed in parallel in the door portion so that the drawing directions of electric wires are opposite to each other. At this time, the two Peltier elements are respectively attached in common to a metal heat conductor arranged to be in contact with the inner surface side of the Peltier elements, an outer fin arranged on the outer surface side of the Peltier elements, and an inner fin arranged on the inner side of the heat conductor. In addition, one outer fan is arranged on the outer fin, and the interior fan is arranged on the inner fin. A battery accommodation chamber having a housing protruding to an outer part of the container portion and capable of accommodating two batteries is disposed on a short side surface of the container portion.

[0010] According to still another feature of the present invention, the transportable cold storage container includes: a caster arranged on one side of the bottom surface of the container portion, a first belt attachment portion which is arranged on an outer edge portion of the opening of the container portion and a side where the caster is located, a second belt attachment portion which is arranged on an outer edge portion of the opening and a side opposite to the side where the caster is located, and a belt for shouldering being caused to pass through the first belt attachment portion and the second belt attachment portion; wherein a third belt attachment portion is arranged near the second belt attachment portion, and the belt can be used in a first attachment state in which the first belt attachment portion and the second belt attachment portion are used. In addition, a part of the belt for shouldering can be drawn out from the space between the second belt attachment portion and the third belt attachment portion by engaging the part of the belt with the third belt attachment portion, and thereby transport is possible while the caster is brought into contact with the ground and one side of the container portion is floated (a second attachment state). The first attachment state and the second attachment state can be selected. In addition, the transportable cold storage container has Peltier elements for cooling the inside of the container portion and a pack-type battery being attachable/detachable for supplying electric power to the Peltier elements, and a battery accommodation chamber that accommodates the battery is arranged on a side surface on a side of the container portion on which the third belt attachment portion is arranged.
According to still another feature of the present invention, the function of the caster is restricted in a state that the container portion is placed horizontally, and the caster functions only in a state that one side of the container portion is floated. In addition, a part of the belt extending along the second belt attachment portion and the third belt attachment portion is caused to pass through a drawing ring, and a change from the first attachment state to the second attachment state can be made by a user drawing out the drawing ring.

[0011] According to still another feature of the present invention, the third belt attachment portion is arranged at an upper part of the battery accommodation chamber, and the second belt attachment portion and the third belt attachment portion are disposed with a distance therebetween in the horizontal or/and vertical direction. In addition, the Peltier elements, the interior fan, the outer fan, and the outer heat sink are arranged on a side of the door portion opposite to the caster and a side close to the battery accommodation chamber. Furthermore, an elastic body is arranged in a gap between the outer heat sink and the housing of the door portion, thus the rattle of the outer heat sink during caster movement is suppressed.
According to still another feature of the present invention, an axial direction of the rotary shaft of the caster and an axial direction of a pivot shaft of the door portion are disposed to intersect with each other. In addition, the axial direction of the rotary shaft of the caster and the sliding direction for mounting of the battery are disposed parallel to each other. Furthermore, the battery accommodation chamber has an opening for allowing the battery to be mounted inside, and a pivot cover that closes the opening, and the axial direction of the rotary shaft of the caster and the axial direction of a pivot shaft of the cover of the battery accommodation chamber are disposed to intersect with each other. Furthermore, in the second attachment state being a caster movement mode, the belt works to press the door portion and thus the rattle of the door portion during movement can be suppressed.

[Effect]

[0012] According to the present invention, a plurality of Peltier elements is efficiently disposed inside a limited housing, and thus cooling efficiency can be greatly improved. In addition, because power supplies for Peltier elements and element cooling fans (interior fan and outer fan) are separately arranged, rotation fluctuations of the fans caused by voltage switching of the Peltier elements can be prevented, a stable air blowing effect of the fans can be maintained regardless of an operating condition of the Peltier elements, and the cooling efficiency can be increased compared with the conventional case. In addition, because the operation time for the obtained cooling effect can be extended, the usable time when the battery is used can be extended. Furthermore, by changing the usage of the shoulder belt, it is possible to easily make a change into not only a shouldering state (the first attachment state) but also a caster utilization state (the second attachment state) in which the caster is used to cause a side opposite to the caster to move while rising upward and rotating, and thus a convenient transportable cold storage container can be achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a front view of a cold storage container 1 of an example of the present invention.
FIG. 2 is a right side view of the cold storage container 1 in FIG. 1.
FIG. 3 is a right side view of the cold storage container 1 in FIG. 1, showing a state in which a cover 24 of a battery accommodation chamber 20 is opened.
FIG. 4 is a diagram of a cross-section A-A in FIG. 1.

FIG. 5 is a partially enlarged view showing a heat exchange mechanism 50 in FIG. 4.
FIG. 6 is a diagram of a cross-section B-B in FIG. 1.
FIG. 7 is a diagram of a cross-section D-D in FIG. 2.
FIG. 8 is a diagram of a cross-section C-C in FIG. 1.
FIG. 9 is a circuit diagram of the cold storage container 1 of the present invention.
FIG. 10 is a diagram showing a relationship between control of a Peltier element voltage and the interior temperature in a conventional portable cold storage container.
FIG. 11 is a diagram showing a relationship between control of a Peltier element voltage and the interior temperature in the cold storage container 1 of the present invention.
FIG. 12 is a diagram showing a state in which a part of a shoulder belt 65 in the cold storage container 1 of the example is drawn out to be in a second attachment state.
FIG. 13 is a perspective view showing the shape of a grip 69 arranged as a drawing ring of the cold storage container 1 in FIG. 12.
FIG. 14 is a diagram showing the single grip 69 in FIG. 13, wherein (A) of FIG. 14 is a front view, (B) of FIG. 14 is a top view, and (C) of FIG. 14 is a left side view.
FIG. 15 is a diagram showing the second attachment state in which a part of the shoulder belt in the cold storage container 1 of the example is also engaged with a third belt attachment portion.
FIG. 16 is a diagram showing an attachment state in which a part of the shoulder belt in the cold storage container 1 of the example is also engaged with the third belt attachment portion.
FIG. 17 is a diagram showing a cold storage container 1A of a second example of this example.
FIG. 18 is a longitudinal cross-sectional view of a conventional cold storage container 101.
FIG. 19 is a horizontal cross-sectional view showing an arrangement state of a Peltier element 151 in the conventional cold storage container 101.
FIG. 20 is a top view showing a DC connection cable and an AC adapter.

DESCRIPTION OF THE EMBODIMENTS

Example 1

[0014] Hereinafter, examples of the present invention are described with reference to the drawings. Besides, in the following drawings, the same parts are denoted by the same reference signs, and repeated description is omitted. In addition, in this specification, description is made assuming that the front, rear, up, and down directions are directions shown in the drawings.

[0015] FIG. 1 is a front view of a cold storage container 1. The cold storage container 1 is obtained by adding a heat exchange mechanism using electric power to a so-called cooler box type container, and is configured to be capable of cooling or warming food and the like accommodated therein (hereinafter, referred to as "containments") with pack-type batteries 61 and 62 (see FIG. 3) widely used for power tool as power supplies. The cold storage container 1 has a transportable configuration with an internal volume of about 10-40 liters, for example, 25 liters. A Peltier element is used as the heat exchange mechanism of the cold storage container 1 to enable not only cooling but also warming, but the configuration of this example can also be used to form a cold storage container dedicated to cooling or a hot storage container dedicated to keeping warm. In the specification, regardless of the presence or absence of a hot storage mechanism, the container is referred to as a "cold storage container" as long as there is a cooling function. In the cold storage container 1, a door portion 30 serving as a lid for closing an opening is arranged in a container portion 10 having a substantially rectangular parallelepiped shape that has an opening on the upper side. The container portion 10 has a substantially rectangular parallelepiped shape in which only one surface (the upper surface) is open, and includes four side wall portions (a front wall portion 11a, a rear wall portion 11b (see FIG. 2), a right wall portion 11c, and a left wall portion 11d) defining the opening, and a bottom wall portion 12b serving as a surface on the opposite side when viewed from the opening of the container portion 10. The front wall portion 11a and the rear wall portion 11b (see FIG. 2) are disposed substantially in parallel, the right wall portion 11c connects the right edge of the front wall portion 11a and the right edge of the rear wall portion 11b, and the left wall portion 11d connects the left edge of the front wall portion 11a and the left edge of the rear wall portion 11b. In addition, the upper end of each of the front wall portion 11a, the rear wall portion 11b, the right wall portion 11c, and the left wall portion 11d defines an opening having a substantially rectangular shape in a plan view.

[0016] The opening of the container portion 10 is closed by the door portion 30 that can be opened and closed with respect to the container portion 10. The door portion 30 is pivotally supported by a hinge 19 (described later with reference to FIG. 4) on one side of a long side of the opening of the container portion 10. Two latches 18a and 18b are arranged on a long side (here, the upper edge of the front wall portion 11a) of the opening of the door portion 30 opposite to the long side on which the hinge is arranged. The latches 18a and 18b are manually operable lock mechanisms that are

fixed in a manner that convex portions formed on the latches 18a and 18b side are caught on convex portions 34a and 34b (described later in FIG. 6) formed on the door portion 30 side, and a known fixing member such as a patch lock, a latch or the like can be used. At the upper edge of the front wall portion 11a of the container portion 10, a convex portion 14 for holding the latches 18a and 18b and forming a recess 14a for a hand to open the door portion 30 is formed. Because the bottom surface of a part of the outer edge of the door portion 30 is exposed above the recess 14a, the outer edge in front of the door portion 30 can be easily pulled upward when the latches 18a and 18b are opened. The state in FIG. 1 is a closed state in which the opening of the container portion 10 is closed. When the door portion 30 is turned upward and comes into an open state, the opening of the container portion 10 is opened, and containments can be accommodated into an accommodation space via the opening. In addition, because the opening is closed when the door portion 30 is in the closed state, an accommodation space 13 comes into a closed state, and the heat exchange by the direct contact of the inside and outside air is minimized.

[0017] A first grip portion 16 is formed on the left side of the opening of the container portion 10. Similarly, a second grip portion 17 is formed on the right side of the opening of the container portion 10. The first grip portion 16 and the second grip portion 17 are convex portions formed for transporting while the vicinity of the opposite short sides of the cold storage container 1 is held with both hands, and are arranged near the upper parts of the right wall portion 11c and the left wall portion 11d of the container portion 10. The first grip portion 16 and the second grip portion 17 are formed integrally with the outer surface of the container portion 10 made of a synthetic resin. Recesses 16a and 17a for the operator to easily hold the cold storage container when gripping with both hands are formed on the lower surface side of the parts of the first grip portion 16 and the second grip portion 17 protruding outward in the horizontal direction. In addition, an unillustrated through-hole (described later) for the shoulder belt 65 to penetrate from top to bottom is formed near the center in the front-rear direction of the recesses 16a and 17a. The first grip portion 16 in which the through-hole is formed serves as a first belt attachment portion, and the second grip portion 17 in which the through-hole is formed serves as a second belt attachment portion.

[0018] One belt-shaped shoulder belt 65 is stretched between the first belt attachment portion and the second belt attachment portion. Belt adjusters 66 and 67 are members which are fixed so that overlapped parts of the shoulder belt 65 formed by folding back both ends are penetrated and thereby the overlapped belts do not move relatively, and which adjust an effective length used for shouldering. The belt adjusters 66 and 67 are integrally molded parts made of a synthetic resin or metal, and have a shape in which three parallel elongated plates are connected at both ends by an orthogonal connection portion, and in which two E-shaped members are prepared and joined with the opening sides facing each other. The belt adjusters 66 and 67 have sufficient strength when made of a synthetic resin. The shoulder belt 65 is equipped with a shoulder pad 68 for distributing a local load applied to the shoulder of the operator during shouldering. A known pad can be used as the shoulder pad 68, and the shape and material thereof are arbitrary.

[0019] A pair of casters 88a is arranged near the left end of the bottom wall portion 12b of the container portion 10. Similarly, caster 88b (not shown in FIG. 1) is arranged near the corner of the rear wall portion, the left wall portion 11d, and the bottom wall portion 12b; the caster 88a is pivotally supported by the container portion 10 and a rotary shaft 89a thereof is directed in the front-rear direction. Although not shown in FIG. 1, the rotary shaft of the caster 88b on the rear side is located coaxially with the rotary shaft 89a, and the axial direction thereof is the front-rear direction. When the container portion 10 is kept horizontal as shown in FIG. 1, even if the casters 88a and 88b are installed, the casters 88a and 88b do not substantially operate and the casters 88a and 88b can operate by making the container portion 10 inclined. Here, the state in which the casters 88a and 88b do not substantially operate includes a state in which the opposite side of the casters 88a and 88b on the lower surface of the bottom wall portion 12b comes into contact with the ground and thereby the horizontal movement of the container portion 10 is restricted.

[0020] A battery accommodation chamber 20 having a second rectangular parallelepiped housing is arranged in the right wall portion 11c of the container portion 10. The housing volume of the battery accommodation chamber 20 is configured to be sufficiently smaller than the housing volume of the container portion 10. The battery accommodation chamber 20 is an independent space for accommodating two batteries (described later) and a control circuit board (described later). When the outer wall of the container portion 10 and the outer wall of the battery accommodation chamber 20 are manufactured by integral molding of a synthetic resin, the strength can be sufficiently increased. Because the container portion 10 serving as a container of the cold storage container and the battery accommodation chamber 20 that accommodates a power supply unit such as a battery not shown or the like are configured in separate sections as described above, a limited space can be used effectively without squeezing the internal space of the container portion 10 for mounting of the battery.

[0021] A heat exchange mechanism 50 (described later with reference to FIG. 5) using a Peltier element is arranged in the door portion 30 that can be opened and closed. The container portion 10 is not equipped with any main body component of the heat exchange mechanism such as a fan, a heat sink or the like. In order to arrange the heat exchange mechanism, an air suction port 35 of the outer fan described later is arranged on a part of the upper side of the door portion 30, and an air discharge port 36 is arranged on a part of the front side surface of the door portion 30. Besides, although not shown in FIG. 1, an air discharge port similar to the air discharge port 36 on the front is also arranged on

a part of the rear side surface of the door portion 30. The air sucked into the door portion 30 from the air suction port 35 is discharged from the air discharge port 36 on the front and the air discharge port at the rear (not shown in FIG. 1)

[0022] FIG. 2 is a right side view of the cold storage container 1. Here, a state in which the shoulder belt 65 (see FIG. 1) is removed is shown. The door portion 30 has substantially the same appearance as the door portion of a commercially available cooler box, except that the air suction port 35 and the air discharge port 36 (see FIG. 1) are formed at the upper part. However, the heat exchange mechanism is accommodated in the door portion 30, and thus the height occupied by the door portion 30 in the up-down direction increases. The battery accommodation chamber 20 disposed on the right side of the container portion 10 is a housing that is smaller in the up-down direction and the front-rear direction than the outer housing of the container portion 10. In addition, a front wall portion 21a, a rear wall portion 21b, an upper side wall 21c, and a lower side wall 21d of the battery accommodation chamber 20 are connected to the right wall portion 11c of the container portion 10 with no gap in the joining portions. An opening portion 21f (see FIG. 3 described later) is arranged closer to the rear side than a central surface in the front-rear direction (a cross-section D-D) of the battery accommodation chamber 20, and an openable/closable cover 24 is arranged to cover the opening portion 21f. The cover 24 is formed so as to extend over two surfaces from a right wall portion 21e to the rear wall portion 21b of the battery accommodation chamber 20, and the front edge of the cover 24 is pivotally supported by a pivot shaft 24a whose axis extends in the vertical direction, and a closed state is locked in the rear wall portion 21b by two latch parts, that is, a first latch 26a and a second latch 26b. As the latch parts, for example, a patch lock made of resin that allows a movable claw to be engaged with a convex latch portion formed on the cover 24 side can be used. In FIG. 2, for the sake of description, the first latch 26a is shown in an unlocked state and the second latch 26b is shown in a locked state.

[0023] A power supply jack cover 23 that covers an opening for accessing a power supply jack 71 connecting a power supply cord described later is formed in a part of the battery accommodation chamber 20 on the front lower side. The power supply jack cover 23 is an openable/closable lid which has a plate shape and in which one side is supported pivotally and a lock mechanism is arranged on the other opposite side. An operation display panel not shown is arranged in a partial region 22 on the outer surface of the battery accommodation chamber 20. The operation display panel is equipped with a power switch, various operation buttons (switching of cooling/heating, output mode setting), a display lamp indicating an operating condition, and the like which are not shown.

[0024] The second grip portion 17 having a flange shape protruding in a convex shape toward the outer side in the horizontal direction is formed at the outer edge close to an opening 12a at the upper end of the container portion 10. The second grip portion 17 is a handle for the user to grip with both hands together with the first grip portion 16, and has a sufficient length in the front-rear direction compared with the hands of the user; a recess 17a for facilitating hooking of fingers is formed, and a through-hole (a second belt attachment portion 17b) penetrating the second grip portion 17 from top to bottom is formed in order to cause the shoulder belt 65 to penetrate the vicinity of the center in the front-rear direction of the recess 17a. The cross-sectional shape of the through-hole is an elongated and substantially quadrangular shape, a width WB (the length in the long side direction) of the through-hole serving as the second belt attachment portion 17b is made slightly larger than the width of the belt-shaped shoulder belt 65, and the length of the short side of the through-hole is made larger than the thickness of the shoulder belt 65, and thereby the penetrating shoulder belt 65 can easily move relative to the through-hole. A cord accommodation convex portion 15 which is elongated and protrudes outward is formed from the second grip portion 17 to the upper side wall 21c of the battery accommodation chamber 20. The cord accommodation convex portion 15 is formed to secure a space for wiring in an inner part thereof.

[0025] FIG. 3 shows a state in which the cover 24 is opened from the state of FIG. 2. The cover 24 is rotatable by about 180 degrees around the pivot shaft 24a. The pivot shaft 24a is disposed so as to extend in the vertical direction (the up-down direction). When the axial direction (the front-ear direction) of the rotary shaft 89a of the casters 88a and 88b is parallel to the axial direction (the up-down direction) of the pivot shaft 24a, a force for opening the cover 24 repeatedly acts in order that the direction of vibration generated centering on the rotary shaft 89a of the casters 88a and 88b is the same as the pivot shaft direction of the cover 24, and the load applied to the first latch 26a, the second latch 26b and the pivot shaft 24a increases. On the contrary, in the arrangement of the pivot shaft 24a of the example, the direction of the vibration generated centering on the casters 88a and 88b intersects with the axial direction of the pivot shaft 24a, and thereby it is possible to prevent a force from being applied in the direction in which the cover 24 is to be opened due to the vibration.

[0026] The two batteries 61 and 62 are arranged in parallel in the up-down direction so that the mounting surfaces on which connection terminals are disposed are directed in the vertical direction. The mounting direction is directed to the front side from the rear of the battery accommodation chamber 20, and the batteries 61 and 62 are mounted by being moved from the rear to the front in a lying state. When viewed from the right side surface, the length in the front-rear direction of the opening portion 21f is set as a length DB that is about substantially half of the batteries 61 and 62 to be accommodated. The length DB is set to a length that does not hinder an operation of the user pressing latch buttons (not shown) of the batteries 61 and 62 in a state of being mounted in the battery accommodation chamber 20. In addition, a height HB of the accommodation space inside the battery accommodation chamber 20 is set to a size for securing a predetermined space around the batteries 61 and 62, which is a size corresponding to two batteries or larger so that

the user can press each of the latch buttons and draw out the batteries 61 and 62. Here, the height HB of the accommodation space is made substantially equal to the height of the opening portion 21f. In the example, a plurality of batteries can be accommodated in the battery accommodation chamber 20, and the accommodation space of the battery accommodation chamber 20 can be hermetically closed by arranging the openable/closable lid (the cover 24) at the opening part, and thus the batteries 61 and 62, the control circuit board and the like can be completely covered and can be protected from intrusion of dust, rainwater and the like.

[0027] FIG. 4 is a diagram of a cross-section A-A in FIG. 1. The accommodation space 13 is a space for accommodating containments and is defined by inner surfaces of the surrounding wall portions (the rear surface of the front wall portion 11a, the front surface of the rear wall portion 11b, the left surface of the right wall portion 11c, the right surface of the left wall portion 11d, and the upper surface of the bottom wall portion 12b). The outer surface and the inner surface of the wall portion of the container portion 10 are made of ABS resin for example, and the space between the outer surface and the inner surface is filled with a heat insulating material 33 such as urethane foam or the like, and thereby the heat insulating property in the accommodation space 13 is secured. An outer wall 31 and an inner wall 32 are arranged in the door portion 30. The heat exchange mechanism 50 is arranged inside the door portion 30. The heat exchange mechanism 50 is a cooling device that removes heat in the accommodation space 13 and discharges the heat to the atmosphere, or a heating device that absorbs heat in the atmosphere and discharges the heat into the accommodation space 13. The heat exchange mechanism 50 mainly includes two Peltier elements 51 and 52, an outer heat sink 54 and an outer fan 55 disposed on the front surface side (the outer surface side) of the Peltier elements 51 and 52, an inner heat sink 56 (56a-56c) disposed on the rear surface side (the inner surface side) of the Peltier elements 51 and 52, and an interior fan 57. In the example, because the batteries 61 and 62 are accommodated in the battery accommodation chamber 20 instead of the door portion 30, an increase in weight of the door portion 30 can be suppressed, the center of gravity decreases and the stability or portability of the cold storage container 1 can be improved. Besides, as disclosed in patent literature 1, a configuration is also conceivable in which the heat exchange mechanism 50 and the battery 61 is mounted in the door portion 30. However, according to this configuration, the door portion 30 becomes heavy, and there is a high possibility that the door portion 30 is difficult to open and close.

[0028] FIG. 5 is a partially enlarged view showing the heat exchange mechanism 50 in FIG. 4. In the inner wall 32 of the door portion 30, a through-hole 32a for arranging the heat exchange mechanism is formed. The Peltier elements 51 and 52 are disposed adjacently with a narrow gap 53a in the front-rear direction so as to be parallel to the surface direction of the inner wall 32. The upper surfaces of the Peltier elements 51 and 52 are in common contact with the outer heat sink 54, and the lower surfaces are in common contact with a heat conductor 56a of the inner heat sink 56. A red cord and a black cord described later are respectively connected to the Peltier elements 51 and 52, and when a current flows from the red cord to the black cord, the upper surfaces generate heat and the lower surfaces absorb heat (the lower surfaces are cooled). On the other hand, when a current flows from the black cord to the red cord, the upper surfaces absorb heat and the lower surfaces generate heat. The heat conductor 56a is, for example, an aluminum block, and is formed with a size corresponding to the through-hole 32a. Here, a gap 32c is formed between the through-hole 32a and the heat conductor 56a, and the gap 32c may be filled with an adhesive resin.

[0029] The outer heat sink 54 is formed by a plate-shaped base portion 54a that comes into contact with the upper surfaces of the Peltier elements 51 and 52, and a fin portion 54b that consists of a plurality of plate-shaped fins extending upward from the base portion 54a in an orthogonal direction. The fin portion 54b extends in the front-rear direction and has a predetermined length in the up-down direction, and the outer heat sink 54 is manufactured by integral molding of a light metal such as aluminium or the like. An elastic body 58 such as rubber or the like is interposed between the base portion 54a of the outer heat sink 54 and the inner wall 32. By arranging the elastic body 58 in the gap between the outer heat sink 54 and the housing of the door portion 30 in this manner, the rattle of the outer heat sink 54 during caster movement can be suppressed. The outer fan 55 is arranged adjacent to the upper side of the fin portion 54b. The outer fan 55 is a centrifugal fan, and the outside air is sucked, by the rotation of the outer fan 55, in the axial direction (from top to bottom) from a plurality of slits 35a formed at the air suction port 35, flows in the radial direction as indicated by an arrow AF1 and is discharged from the air discharge port 36 (see FIG. 1). At this time, the outside air comes into contact with the heated outer heat sink 54, thereby removing heat from the outer heat sink 54. Here, the arrow AF1 shows the airflow flowing from above to the rear direction, but an airflow flowing from above to the front direction is also generated in the same manner on the Peltier element 52 side.

[0030] The inner heat sink 56 includes the heat conductor 56a, the base portion 56b, and the fin portion 56c, and these parts are manufactured by integral molding of a light metal such as aluminium or the like. The plate-shaped base portion 56b having a large area is connected to the lower surface of the heat conductor 56a, and the fin portion 56c consisting of a plurality of plate-shaped fins extending from the base portion 56b in an orthogonal direction is formed below the plate-shaped base portion 56b. The fin portion 56c extends in the front-rear direction and has a predetermined length in the up-down direction. The interior fan 57 is formed adjacently below the fin portion 56c. A fan cover 37 made of a synthetic resin and having a plurality of air windows (here, invisible from the relationship of the cross-sectional shape) is arranged on the lower side in the axial direction of the interior fan 57. The interior fan 57 is close to the fin

portion 56c, and sucks the air on the upper surface of the interior of the container portion 10 from below in the axial direction, makes the air flow so as to come into sufficient contact with the fin portion 56c, and discharges the air toward the outer side in the radial direction as indicated by an arrow AF2. In FIG. 5, only the components of the airflow AF2 directed backward are indicated by the arrow, but the airflow AF2 is also discharged in the same manner to the front side in the inner heat sink 56. The cooled inner heat sink 56 removes heat from the air flowing as the AF2, thereby reducing the temperature of the interior. In addition, the air in the interior is sufficiently stirred by the circulation of the air as indicated by the arrow AF2.

[0031] FIG. 6 is a diagram of a cross-section B-B in FIG. 1. The outer edge shape of the door portion 30 has a substantially rectangular shape in a bottom view or a top view, and convex portions 34a and 34b engaged with the latches 18a and 18b are formed on one (front) side of the long side of the outer edge. Near the center clamped between the convex portions 34a and 34b, a narrow recess 34c for the user to put hands when opening the door portion 30 is formed. On the other (rear) side of the long side of the outer edge, attachment portions 34d and 34e for fixing the hinge 19 are arranged. Among the inner wall of the door portion 30, a concave portion 32b recessed upward is formed on the substantially left half, and the substantially right half becomes an arrangement portion 41 of the heat exchange mechanism 50. On the left side of the concave portion 32b, a pivot stopper piece 43 is arranged so as to maintain an open state at a predetermined angle when the door portion 30 is opened. The stopper piece 43 is pivotally supported at the rear by the door portion 30 via a pivot shaft 44, the front side 43a serves as a free end and abuts the upper surface near the opening of the container portion 10, and thereby the door portion 30 can be maintained in a slightly opened state.

[0032] The cross-sectional position in FIG. 6 is the same as that of the lower surfaces of the two Peltier elements 51 and 52. The Peltier elements 51 and 52 have the same size and the same standard and are adjacent to each other with the narrow gap 53a therebetween. The size of the base portion 54a of the outer heat sink 54 is configured to be larger than the combined size of the two Peltier elements 51 and 52. By disposing the two Peltier elements 51 and 52 on one outer heat sink 54 in this manner, it is possible to improve cooling performance and suppress an increase in manufacturing cost caused by an increase in the number of parts. The two surfaces of the Peltier elements 51 and 52 have a square shape, and two power supply cords are drawn out from one side. That is, a red cord 51a and a black cord 51b are drawn out from the Peltier element 51 to the front side, and a red cord 52a and a black cord 52b are drawn out from the Peltier element 52 to the rear side. The drawn-out power supply cords (51a, 51b, 52a, 52b) are wired to a control circuit board 70 of the battery accommodation chamber 20 through the cord accommodation convex portion 15 (see FIG. 2). Here, the direction of the cords drawn out from the Peltier elements 51 and 52 is directed not to the lateral side (the right side) but to the front side or the rear side, and thereby the space required for wiring is reduced, and the size in the left-right direction occupied by the arrangement portion 41 of the heat exchange mechanism is set equal to or less than the size in the left-right direction occupied by a non-arrangement portion 42 of the heat exchange mechanism.

[0033] Here, for comparison with the configuration of the example, the arrangement of a Peltier element 151 in a conventional cold storage container is described with reference to FIG. 19. The configuration of the example is a configuration in which a conventional door portion 130 is replaced with the door portion 30 shown in FIG. 6. In the conventional door portion 130, only one Peltier element 151 is arranged. The size of an outer heat sink 154 in contact with the Peltier element 151 is also a size corresponding to one Peltier element 151. In addition, a red cord 151a and a black cord 151b are disposed so as to be drawn out to the right side for wiring with a control circuit board arranged in the battery accommodation chamber 20. If two Peltier elements are disposed according to the arrangement of the conventional Peltier element 151, the two Peltier elements 151 are adjacent in the front-rear direction, and the red cord 151a and the black cord 151b are drawn back to the right side from each Peltier element 151. Accordingly, a space for drawing back the red cord 151a and the black cord 151b is required as in the example of FIG. 19, and thus a horizontal width denoted by A1 is required to a certain degree and then a length B1 of a concave portion 132b becomes shorter. Therefore, in the example, as shown in FIG. 6, the Peltier elements 51 and 52 are disposed with the gap 53a therebetween so that a side 51d of the Peltier element 51 and a side 52d of the Peltier element 52 are adjacent to each other, wherein the side 51d is opposite to a side 51c of the Peltier element 51 from which the red cord 51a and the black cord 51b are drawn out, and the side 52d is opposite to a side 52c of the Peltier element 52 from which the red cord 52a and the black cord 52b are drawn out. As a result, an increase in the area occupied by the accommodation space of the heat exchange mechanism 50 can be suppressed even if two Peltier elements 51 and 52 are arranged in parallel. In addition, the direction of the power supply cords drawn out from the Peltier elements 51 and 52 is not directed to the lateral side (the right side), but the positions of the Peltier elements 51 and 52 are shifted closer to the right side than the conventional example shown in FIG. 19, and thus the length of the red cords 51a and 52a and the length of the black cords 51b and 52b can be suppressed.

[0034] FIG. 7 is a diagram of a cross-section D-D in FIG. 2. Here, when the inner width of the container portion 10 is set as W, the distance between a side on which the heat exchange mechanism 50 is accommodated and a side on which the heat exchange mechanism 50 is not accommodated is made substantially equal to W/2. With this configuration, a large area of the part having the maximum height H (= H1 + H2) in the container can be secured by the recess 32b, which is advantageous for accommodating a high container. Battery attachment portions 25a and 25b are disposed in

the up-down direction in the battery accommodation chamber 20. The battery attachment portions 25a and 25b have connection terminals not shown and are connected to connection terminals (not shown) formed on the batteries 61 and 62 sides. A pair of guide rails (not shown) extending parallel to each other is formed in the battery attachment portions 25a and 25b. The control circuit board 70 is disposed in a part of the battery accommodation chamber 20 closer to the container portion 10 than the batteries 61 and 62. The control circuit board 70 is disposed so that the surface direction thereof is vertical, and a cord group 59 including a power supply cord to the Peltier elements 51 and 52, a power supply cord to the outer fan 55, a power supply cord to the interior fan 57, a signal line to a temperature sensor 78 (described later with reference to FIG. 9), and the like is wired to the door portion 30.

[0035] FIG. 8 is a diagram of a cross-section C-C in FIG. 1. The two batteries 61 and 62 are disposed in parallel in the up-down direction with a predetermined distance therebetween. The sliding direction for mounting of the batteries 61 and 62 is a direction from the rear to the front (the horizontal direction), and the direction is parallel to the axial direction of the rotary shaft 89a of the casters 88a and 88b. The control circuit board 70 is arranged on the front side of the batteries 61 and 62. The control circuit board 70 is equipped with a power supply connection portion, that is, a power supply jack 71 for enabling connection to an external power supply other than the batteries 61 and 62. In the power supply jack 71, a terminal 85b as shown in (A) of FIG. 20 that can be connected to the power supply jack 71 is included at one end, and an in-vehicle DC cord 85 including a cigar socket 85a, or an AC-DC conversion adapter 86 as shown in (B) of FIG. 20 that converts AC power to DC power can be connected to the other end. The AC-DC conversion adapter 86 has an outlet 86a connected to a household commercial power supply (for example, AC of 100 V), an adapter portion 86b that accommodates an AC-DC converter, and a terminal 86c that can be connected to the power supply jack 71.

[0036] Next, an electric configuration of the cold storage container 1 is described using FIG. 9. The equipment shown in FIG. 9 is accommodated in the housing of the battery accommodation chamber 20 where the Peltier elements 51 and 52 are not disposed, and a microcomputer 77 or an electric circuit part is mainly mounted on the control circuit board 70 (see FIG. 8). The cold storage container 1 uses a power supply to supply a predetermined direct current to the two Peltier elements 51 and 52, and thereby causes one surface of the Peltier elements 51 and 52 to absorb heat and causes the other surface to generate heat. The amount of heat absorbed by the Peltier elements 51 and 52 is substantially proportional to the magnitude of an applied voltage (V), but when the applied voltage is too large, the amount of generated heat increases and the cooling efficiency is reduced, and thus the efficiency of about 50-60% of the maximum voltage increases. The driving of the Peltier elements 51 and 52 and the driving of the fans 55 and 57 are controlled by the microcomputer 77. The microcomputer 77 controls the operation of the cold storage container 1, and a commercially available one-chip type microcontroller is used therefor. The microcomputer 77 operates at a voltage of 5 V or 3.3 V, and a power supply circuit for the microcomputer 77 is not shown in FIG. 9. The power supply for the microcomputer 77 may be generated utilizing electric power of the batteries 61 and 62 and using a DC-DC converter such as a three-terminal regulator circuit or the like.

[0037] The power supply of the cold storage container 1 is a three-power supply system. One power supply is the batteries 61 and 62 disposed in the battery accommodation chamber 20. By enabling operation using the batteries 61 and 62, the cold storage container 1 can be operated even in an environment in which a commercial power supply or an in-vehicle power supply cannot be obtained. Here, two attachable/detachable batteries can be mounted so that the operating time determined by the battery is extended. When two batteries are used, a connection method such as switching control, series connection, or parallel connection can be employed. In the example, the switching control method is employed; in the case of battery driving, the microcomputer 77 selects and uses one of the battery 61 and the battery 62 in order. Therefore, the batteries 61 and 62 are connected in parallel to the Peltier elements 51 and 52 serving as loads, and relay switches 75 and 76 are arranged respectively on the batteries 61 and 62. In addition, diodes D1 and D2 are arranged so that a current does not circulate between the batteries 61 and 62. The opening and closing of the relay switches 75 and 76 are controlled by the microcomputer 77.

[0038] In accordance with a predetermined rule, the microcomputer 77 can select, for example, (1) an order of using the battery 61 first and then using the battery 62, (2) an order of measuring respective voltage of the batteries 61 and 62 and using the batteries 61 and 62 from the battery side with a higher remaining amount or from the battery side with a lower remaining amount, and the like. In addition, not only battery packs having the same standard but also batteries having different rated voltages can be mixed and mounted as the batteries 61 and 62. For example, a battery having a rated voltage of 14.4 V may be used as the battery 61, and a battery having a rated voltage of 18 V may be used as the battery 62. However, because the battery is limited to those that can be physically mounted on the battery attachment portions 25a and 25b of the battery accommodation chamber 20, a configuration is preferable in which a plurality of types of batteries is mounted directly or mounted via a conversion adapter on the battery attachment portions 25a and 25b (see FIG. 7).

[0039] The batteries 61 and 62 accommodate a plurality of secondary battery cells. In the example, a lithium ion secondary battery is used. Although not shown here, the batteries 61 and 62 have four signal terminals for control, namely, a temperature signal output terminal (T), an overcharging signal output terminal (V), a battery type discrimination terminal (Ls), and a battery remaining amount signal output terminal (LD), in addition to power supply connection terminals

that are a charging positive terminal (C+), a discharging positive terminal (+), and a charging/discharging negative terminal (-). All or a part of the sign terminals are connected to the microcomputer 77. Accordingly, the microcomputer 77 can detect the type, the remaining amount, and the like of the batteries 61 and 62.

[0040] A DC-DC converter 80 serving as a first power supply unit supplies a direct current for driving to the Peltier elements 51 and 52. For example, a voltage of 12 V or 6 V is generated from a battery of 14.4 V, 18 V, or 12 V or higher and supplied to the Peltier elements 51 and 52. The "Peltier element" is referred to as an electronic cooling element and can make use of a principle that heat is transferred between metals by joining different metals and passing a current therethrough, to cool one surface side. The Peltier elements have excellent durability and reliability because they have no movable parts, and the handling is also simple. In addition, there is no risk of gas leakage or corrosion of a refrigerant, and the handling is also simple. Furthermore, the Peltier element can invert between a surface to be heated and a surface to be cooled by inverting the polarity of the applied voltage (positive, negative). FIG. 9 shows that the polarity of the current flowing through the Peltier elements 51 and 52 is fixed, but the cold storage container 1 can also be used as a hot storage container without changing the overall configuration thereof by interposing an unillustrated switching circuit for inverting the polarity.

[0041] Switching elements M6 and M7 such as FETs (field effect transistors) are interposed in the electric power supply circuit to the Peltier elements 51 and 52. A control signal from the microcomputer 77 is input to the gates of the switching elements M6 and M7, and the microcomputer 77 can stop the operation of one or both of the Peltier elements 51 and 52 by disconnecting one or both of the switching elements M6 and M7. The resistors R1 and R3-R5 are circuits for setting a feedback voltage (return voltage) FB to the DC-DC converter 80, and semiconductor switching elements M3-M5 are directly arranged in the resistors R3-R5 respectively. The output of the microcomputer 77 is connected to the gates of the semiconductor switching elements M3-M5, and respective connection or disconnection can be performed by the control of the microcomputer 77. By the combination of the connection or disconnection of the switching elements M3-M5, the feedback voltage (return voltage) to the DC-DC converter 80 is changed, and the output voltage from the DC-DC converter 80 to the Peltier elements 51 and 52 can be changed.

[0042] DC-DC converters 81 and 82 serving as a second power supply unit are arranged on the output sides of the batteries 61 and 62. The DC-DC converter 81 is a power supply for driving the outer fan 55. The DC-DC converter 82 is a power supply for driving the interior fan 57. In addition, a switching element M1 is interposed for electric power supply circuit to the outer fan 55, and a semiconductor switching element M2 is interposed for electric power supply circuit to the interior fan 57. The switching elements M1 and M2 can be controlled to be on/off by the microcomputer 77.

[0043] When input is made via the power supply jack 71 serving as a connection portion of an external power supply and via a commercial power supply or an external DC power supply, a charging circuit 72 operates. The output of the charging circuit 72 is connected to the batteries 61 and 62 and connected to the DC-DC converters 80-82 via the relay switches 75 and 76. Accordingly, electric power can be supplied to the DC-DC converters 80-82, and the batteries 61 and 62 can be charged. In the circuit of the example, a charging control circuit 73 is arranged to control charging of the batteries 61 and 62. The microcomputer 77 detects, by an input detection circuit 74, whether an external power supply is connected or not, and outputs the detection result to the microcomputer 77. The microcomputer 77 controls the charging control circuit 73 according to this output. Besides, the batteries 61 and 62 can be charged even when the relay switches 75 and 76 are both turned off. Furthermore, the temperature sensor 78 such as a thermistor or the like that detects the temperature of the interior is arranged, and thus the microcomputer 77 can detect the interior temperature. The microcomputer 77 optimizes the electric power supplied to the Peltier elements 51 and 52 based on the battery mounting state (one or two), the connection state with the external power supply, and the interior temperature (the temperature in the accommodation space 13). At this time, the outer fan 55 and the interior fan 57 can be operated continuously regardless of the operating condition of the Peltier elements 51 and 52, and thus the operation of the heat exchange mechanism 50 and the operation of the outer fan 55 and the interior fan 57 can be controlled independently of each other, and efficient operation can be performed even with limited electric power of the batteries 61 and 62.

[0044] FIG. 10 is a diagram illustrating a control method of the Peltier element 151 in the conventional example; the upper graph shows a relationship between the elapse of time (unit: minute) and the interior temperature (unit: °C), and the lower graph shows a relationship between the elapse of time (unit: minute) and the supply voltage (unit: V) to the Peltier element 151. The horizontal axes of the upper and lower graphs are shown together. When the power supply of the Peltier element 151 is turned on at time t = 0, an interior temperature 91 decreases as indicated by an arrow 91a and reaches a desired temperature C1 (here, a temperature lower than the outside air temperature by 20°C) at time t1 as indicated by an arrow 91b. A voltage 92 applied to the Peltier element 151 so far is constant at 12 V, and the voltage supply to the Peltier element 151 is stopped at time t1 (the voltage is set to 0 as indicated by an arrow 92b). When the electric power supply to the Peltier element 151 is stopped at time t1, the interior temperature gradually increases as indicated by an arrow 91c. When the temperature reaches a predetermined threshold value at time t2 as indicated by an arrow 91d, that is, the temperature reaches a temperature at which electric power supply to the Peltier element 151 is restarted, a voltage of 12 V is applied to the Peltier element 151 as indicated by an arrow 92c. As a result, the interior temperature decreases as indicated by an arrow 91e. Similarly, after time t3, the on/off control of the Peltier element

151 as at time t1-t3 is repeated. In the conventional cold storage container, the Peltier element 151, the outer fan and the interior fan use a common power supply circuit, and thus voltage switching of only the Peltier element 151 cannot be made.

[0045] FIG. 11 is a diagram illustrating a control method of the Peltier elements 51 and 52 in the example. The upper graph in FIG. 11 shows a relationship between the elapse of time (unit: minute) and the interior temperature (unit: °C), and the lower graph shows a relationship between the elapse of time (unit: minute) and the supply voltage to the Peltier elements (unit: V). Here, by supplying the same voltage to the two Peltier elements, the temperature is lowered to a temperature C2 (wherein, C2 < C1) lower than the outside air temperature by 25°C. However, because the interior temperature is controlled by the microcomputer 77, the temperatures C1 and C2 are controlled not to reach a predetermined temperature (for example, less than 5°C). In addition, the temperature C2 is a setting value when the cooling mode is "strong", and a setting temperature difference is set small when the cooling mode is "medium" or "small".

[0046] When the power supply of the Peltier element is turned on at time t = 0, the interior temperature 93 decreases as indicated by an arrow 93a and reaches the desired temperature C2 (here, a temperature lower than the outside air temperature by 25°C) at time 11. A voltage 93 applied to the Peltier elements 51 and 52 so far is constant at 12 V, and at time t1, the voltage to the Peltier elements 51 and 52 is reduced from 12 V as indicated by an arrow 94a to 6V as indicated by an arrow 94b. The voltage of 6V may be generated by reducing the output of the DC-DC converter 80, or reducing the effective value of the voltage to 6V by performing PWM control on the switching elements M6 and M7 (see FIG. 9). When the voltage is reduced to 6 V at time t1 as indicated by the arrow 94b, the interior temperature 93 becomes substantially constant as indicated by an arrow 93c. However, the temperature may also slightly decrease as indicated by an arrow 93d (or increase) as time elapses. Because the temperature change state largely depends on the type, size, temperature, and the like of the containments accommodated in the interior, the temperature change as indicated by the arrow 93d is an example.

[0047] When the temperature reaches a predetermined threshold value at time t2 as indicated by an arrow 93e, that is, the temperature reaches a temperature at which electric power supply to the Peltier elements 51 and 52 is stopped, the microcomputer 77 stops the voltage supply to the Peltier elements 51 and 52 as indicated by an arrow 94c. Then, the interior temperature 93 increases as shown by an arrow 93f as time elapses, but when the temperature reaches a predetermined threshold value at time t4 as indicated by an arrow 93g, that is, the temperature reaches a temperature at which electric power supply to the Peltier elements is restarted, a voltage of 12 V is applied to the Peltier elements 51 and 52 as indicated by an arrow 94d. At this time, instead of a voltage of 12 V, a voltage of 6 V may be applied to the Peltier elements 51 and 52, but selection of 12 V or 6 V may be determined by the microcomputer 77 in consideration of the increasing speed of the arrow 93f. When the electric power supply to the Peltier elements is restarted at time t3, the interior temperature gradually decreases as indicated by an arrow 93h. At time t4, when the temperature reaches a predetermined threshold, that is, a threshold temperature at which the electric power of the Peltier elements 51 and 52 is reduced, the voltage to the Peltier elements is reduced to 6V as indicated by an arrow 94e. Hereinafter, similar control is repeated.

[0048] As described above, according to the example, in the portable cold storage container 1, two Peltier elements 51 and 52 are used for operation while the voltages of a plurality of voltages (12 V, 6 V) are switched, and thus the cooling performance is greatly improved compared with the conventional cold storage container. In addition, because a long driving time is secured in a voltage region where the cooling efficiency of the Peltier element is the best, that is, at a driving voltage of 50-60% of the maximum allowable voltage, an increase in overall electric power consumption can also be avoided. Besides, in the above example, only the cooling mode in which the upper surfaces of the Peltier elements 51 and 52 generate heat and the lower surfaces absorb heat when electric power is supplied to the Peltier elements 51 and 52 has been described, but the operation in a hot storage mode where the upper surfaces of the Peltier elements 51 and 52 are cooled and the lower surfaces are made to generate heat can be controlled in the same manner.

[0049] Next, referring to FIG. 12, the state (the second attachment state) is shown in which a part of the shoulder belt 65 in the cold storage container 1 (the vicinity of an arrow 65c) is drawn outside from the second belt attachment portion 17b, and the casters 88a and 88b are used to operate the cold storage container 1. Here, a part of the shoulder belt 65 located on the outer side (here, the right side) of the second grip portion 17 is drawn upward in a state that the belt adjuster 67 is adjusted so as to be located sufficiently upside, that is, the effective length of the shoulder belt is shortened. At this time, if a drawing ring or a grip 69 is made to pass through the shoulder belt 65 at the outer part of the second grip portion 17 as indicated by the arrow 65c of the shoulder belt 65, the operator can perform caster movement by pulling the grip 69. At this time, if the position of the belt adjuster 67 is appropriately set, the second attachment state in which the caster movement is easily performed can be changed without changing the configuration of the first grip portion 16 and the second grip portion 17 from the conventional configuration. When a change from the second attachment state of the shoulder belt 65 shown in FIG. 12 to the first attachment state shown in FIG. 1 is made, it is only necessary to move the vicinity of an arrow 65a of the shoulder belt 65 upward. In addition, when returning to the first attachment state, the grip 69 is held at a position in contact with the second grip portion 17, and thus when the operator moves the cold storage container 1 in a shouldering state, there is no risk of rattle of the grip 69 or obstruction caused by the grip

69. Besides, although illustration of a shoulder pad 68 is omitted in FIG. 12, the shoulder belt can be changed into the second attachment state as shown in FIG. 12 even when the shoulder pad 68 is attached.

[0050] FIG. 12 shows a state in which the grip 69 is gripped and the right side of the container portion 10 is slightly lifted counterclockwise. The swing centers at this time are the rotary shafts 89a and 89b of the casters 88a and 88b. In FIG. 12, both the caster 88b and the rotary shafts 89b thereof are not shown, but the caster 88b and the rotary shaft 89b thereof are located at the same position as the caster 88a when viewed through from the front. When the user walks while lifting up the grip 69 with one hand, the battery accommodation chamber 20 swings up and down due to up-down fluctuation of the arm position during walking. In addition, vibration caused by unevenness of the ground is transmitted via the casters 88a and 88b, and similar to the swing direction, the vibration direction is also the up-down direction of the container portion 1. At this time, the batteries 61 and 62 with a heavy weight are mounted inside the battery accommodation chamber 20. In the example, with a relationship in which the mounting direction of the batteries 61 and 62 (the longitudinal direction of a mounting rail portion) is parallel to the axial directions of the rotary shafts 89a and 89b of the casters 88a and 88b, among the vibration (the swing direction in FIG. 12) transmitted to the batteries 61 and 62 during the caster movement, the force component acting in the direction for removing the batteries 61 and 62 can be significantly reduced.

[0051] FIG. 13 is a diagram showing a specific shape of the grip 69 used as the drawing ring shown in FIG. 12. The grip 69 is manufactured by integral molding of a synthetic resin, and includes a cylindrical grip portion 69a for the operator to grip, a belt holding portion 69c in which a through-hole 69d for penetration of the shoulder belt 65 is formed, and a connection portion 69e that connects the belt holding portion 69c to both ends of the grip portion 69a. An opening portion 69b surrounded by the grip portion 69a, the belt holding portion 69c, and the connection portion 69e has a size large enough for placing four fingers from the index finger to the little finger of the operator. The belt holding portion 69c, which is a holding part that allows the shoulder belt 65 to penetrate from one side to the other side via the through-hole 69d, has a horizontal width sufficiently larger than the horizontal width of the shoulder belt 65, and secures sufficient strength to withstand a tensile load applied to the opening portion 69b. In addition, it is important that the shoulder belt 65 and the through-hole 69d can easily slide, and the corners are formed with a gently curved surface so that the shoulder belt 65 does not hurt during the sliding.

[0052] FIG. 14 is a diagram showing the single grip 69, wherein (A) of FIG. 14 is a front view, (B) of FIG. 14 is a top view, and (C) of FIG. 14 is a left side view. The horizontal width of the grip portion 69a is set to a size optimal for gripping with one hand. Here, FIG. 14 is a diagram of the single grip 69, and thus the not-in-use state is shown, and the direction is shown on the right side. In actual use, the user grips the grip portion 69a and moves the vicinity of the arrow 65c of the shoulder belt 65 (see FIG. 12) upward through the through-hole 69d, and thus the grip 69 rises up. At this time, at the part where the load is applied to the user finger, particularly on the side facing the opening portion 69b of the grip portion 69a, a soft layer (elastomer) is formed on the surface so that the hand hardly slips and the operator can grip in a comfortable state.

[0053] (B) of FIG. 14 is a top view of the grip 69, and it can be understood that the belt holding portion 69c is sufficiently thinner than the grip portion 69a when viewed together with the left side view in (C) of FIG. 14. The shoulder belt 65 is made to penetrate the belt holding portion 69c from one side to the other side as shown by a dotted line. When the operator moves the grip portion 69a obliquely upward in this state, the shoulder belt 65 is drawn upward as indicated by the arrow 65c shown in FIG. 12. As described above, the shape of the grip 69 has been described with reference to FIGS. 13 and 14, but the shape of the grip 69 has a high degree of freedom in design, and other shapes are available as long as the grip portion 69a and the through-hole 69d for penetration of the belt are arranged. In addition, the material of the grip 69 is not limited to synthetic resin and may be made of cloth, leather, metal frame, other materials, or a combination thereof. Furthermore, the grip 69 may not be always fixed to the shoulder belt 65, and may have a shape in which a cantilever type hook is formed instead of the through-hole 69d and the grip 69 can be easily mounted on or detached from the shoulder belt 65.

[0054] Next, the state (the second attachment state) is shown in FIG. 15 in which a part of the shoulder belt in the cold storage container 1 of a variant of the example is drawn out from the second belt attachment portion and penetrates a third belt attachment portion 27. Here, the third belt attachment portion 27 is a convex portion arranged at the upper part of the battery accommodation chamber 20 and protruding upward, and a through-hole penetrating from left to right side in the horizontal direction is formed near the center in the front-rear direction of the convex portion. In FIG. 15, a part of the shoulder belt 65 that is extended to the outer peripheral side (the right side) of the second grip portion 17 is drawn out downward, and the drawn-out part is made to penetrate the through-hole of the third belt attachment portion 27 of the battery accommodation chamber 20 from left side to right side and further drawn outside (rightward). FIG. 15 shows this drawing-out state. By passing the shoulder belt 65 through the through-hole of the third belt attachment portion 27 in this manner, the vicinity of an arrow 68a of the shoulder belt 65 is drawn as indicated by an arrow 96, and the belt adjuster 67 approaches the second grip portion 17.

[0055] From the belt adjuster 67, the shoulder belt 65 penetrates through the second belt attachment portion 17b of the second grip portion 17, passes through the through-hole of the third belt attachment portion 27 as indicated by an

arrow 68b, forms a loop shape as indicated by arrows 68c, 68d, and 68e to penetrate through the third belt attachment portion 27 again from right to left, and is connected to the belt adjuster 67 from the third belt attachment portion 27 as indicated by an arrow 68f. In this state, the part of the arrows 68c-68e of the shoulder belt 65 functions as a pulling cord, and thus the user can grip the vicinity of the arrow 68d of the shoulder belt 65 and thereby pull the shoulder belt 65 rightward while the battery accommodation chamber 20 side is floated up from the ground. Because the direction of the rotary shafts of the caster 88a and the caster 88b arranged rearward (not shown in the drawing) is the front-rear direction, by directly pulling the shoulder belt 65 rightward while the battery accommodation chamber 20 side is floated up from the ground, movement toward the right direction using the casters 88a and 88b is possible. In the movement using the casters 88a and 88b, vibration is transmitted from the container portion 10 to the door portion 30 according to the unevenness condition of the ground, and the vibration is easily transmitted to the door portion 30. When the axial direction (the front-back direction) of the casters 88a and 88b is parallel to the direction of the pivot shaft (the left-right direction) of the hinge 19 of the door portion 30, a force for opening the door portion 30 is repeatedly applied in order that the direction of the vibration generated centering on the rotary shaft of the caster is the same as the pivot direction of the door, and the load applied to the latches 18a and 18b and the pivot shaft of the hinge 19 increases. On the contrary, if the arrangement is made so that the axial direction (the front-back direction) of the casters 88a and 88b intersects with the direction of the pivot shaft (the left-right direction) of the hinge 19 of the door portion 30 as in the example, the vibration direction intersects with the pivot direction of the door portion 30, and thus the load on the latches 18a and 18b and the pivot shaft of the hinge 19 is reduced.

[0056] In this manner, in the variant of the example, by arranging the third belt attachment portion 27 on the upper surface of the battery accommodation chamber 20 and drawing out the shoulder belt 65 to penetrate the third belt attachment portion 27, it is possible to easily perform the caster movement in which the casters 88a and 88b are used as rotating casters to enable movement around the ground. In addition, in the second attachment state in which large vibration is applied from the casters 88a and 88b, the shoulder belt 65 is disposed along the upper surface of the door portion 30, and thus the force for opening the door portion 30 can be suppressed. In particular, even if the latches 18a and 18b of the door portion 30 are incompletely locked, the shoulder belt 65 always works to press the upper surface of the door portion 30, and thus the vibration to the parts arranged in the door portion 30 is also suppressed. Furthermore, because the third belt attachment portion 27 is located at a position separated from the caster 88a, the amount of swing in the up-down direction of the container portion 10 can be reduced compared with the example in FIG. 12.

[0057] In order to cancel the setting for caster movement of the shoulder belt 65 as shown in FIG. 15, it is only necessary to pull the vicinity of the arrow 68f upward and thereby pass the parts of the arrows 68c-68e of the shoulder belt 65 through the through-hole of the third belt attachment portion 27 from right to left. Regarding the change to the shoulder mode, the vicinity of the arrow 68a of the shoulder belt 65 may be moved upward only, and the user can easily return the state to the original state (the first attachment state) in FIG. 1. Besides, in the state of the shoulder belt 65 as shown in FIG. 15, the shoulder belt 65 comes close directly above the air suction port 35. However, compared with the horizontal width of the shoulder belt 65, the diameter of the outer fan 55 is sufficiently large, and the expansion of the air window of the air suction port 35 is also sufficiently larger than the horizontal width of the shoulder belt 65, and thus the shoulder belt 65 does not completely block the air suction port 35. Accordingly, even if the cold storage is maintained by battery driving during the caster movement, it is possible to keep the air suction via the air suction port 35 unaffected.

[0058] As described above, in the example, a part of the shoulder belt 65 drawn out from the second belt attachment portion 17b is penetrated and latched, and thereby a caster mode can be realized in addition to the conventional shoulder belt mode. Moreover, because it is unnecessary to arrange a dedicated grip portion for caster movement, an increase in size of the cold storage container 1 caused by installation of the grip portion can be avoided. In addition, movement on flat ground such as asphalt or the like becomes easy by enabling the caster movement, and thus it is possible to achieve a cold storage container with improved convenience. Furthermore, because the mounting portions of the batteries 61 and 62 are separated from the casters 88a and 88b which become vibration sources when the casters are used, the vibration generated between the batteries and the battery accommodation chamber (a battery attachment/detachment portion) can be reduced. Besides, if the third belt attachment portion 27 is arranged as shown in FIG. 15, it is possible to not only get into the caster movement mode (the second attachment state) by drawing-back of the shoulder belt 65 as shown in FIG. 15, but also form a configuration in which an independent towing belt is arranged in the third belt attachment portion 27.

[0059] FIG. 16 is a variant of the example of FIG. 15. As shown in FIG. 15, when the shoulder belt 65 is made to pass through the third belt attachment portion 27 in an overlapped state, the taking-back of the belt during the shoulder movement and the caster movement, in particular, the operation for causing the shoulder belt 65 to penetrate the third belt attachment portion 27 may be troublesome. Thus, as shown in (A) of FIG. 16, the end of the shoulder belt 65 is made to penetrate in one direction from the second belt attachment portion 17b to the third belt attachment portion 27 as indicated by the arrow 68b, and then is connected to the belt adjuster 67 on the outer side of the third belt attachment portion 27 and the second grip portion 17 as indicated by the arrow 68c. By being made to pass through the third belt attachment portion 27 in advance in this manner, the shoulder belt 65 can be used as shown in (A) of FIG. 16 during

shouldering, and the caster movement can be easily performed by only drawing out the vicinity of the arrow 68c during caster movement. In order to facilitate this drawing-out operation, the second belt attachment portion 17b and the third belt attachment portion 27 may be disposed with a certain distance therebetween so as to have a gap that is large enough for easy entrance of fingers of the operator. When returning to the shoulder mode from the state of (B) of FIG. 16, it is only necessary to pull the vicinity of the arrow 68a upward.

Example 2

[0060] FIG. 17 is a diagram showing a cold storage container 1A of a second example of the example. Here, a container portion 10A is higher than the container portion 10 of Example 1 and has a larger volume. Configurations other than the container portion 10A are formed of the same components as those of the cold storage container 1 of the first example shown in FIGS. 1-8. In particular, the door portion 30 and the heat exchange mechanism 50 attached to the door portion 30 are interchangeable. The first grip portion 16 is arranged on the side (the left side wall surface) of the container portion 10A where the casters 88a and 88b (88b is not shown in the drawing) are arranged. On the other hand, on the side (the right side wall surface) of the container portion 10A where the battery accommodation chamber 20 is arranged, the second grip portion 17 and a third belt attachment portion 28 are arranged with a predetermined interval in the up-down direction. The outer edge shape of the third belt attachment portion 28 is completely the same shape as the second grip portion 17. However, because the third belt attachment portion 28 is used not as a grip portion but only for penetration of the shoulder belt, it is unnecessary to arrange a recess functioning as a handle, such as the recess 17a, on the third belt attachment portion 28 side. In addition, because the third belt attachment portion 28 does not function as a handle portion, the size of the third belt attachment portion 28 is specialized only to a function for passing the belt, the length in the front-rear direction may be shorter than that of the second grip portion 17, and the size may be a sufficient size necessary for holding the shoulder belt 65.

[0061] The shoulder belt 65 causes the vicinity of the arrow 65b (the inner shoulder belt 65) following the arrow 65a to penetrate the through-hole of the second grip portion 17 and extends downward as indicated by the arrow 65c, further penetrates the through-hole of the third belt attachment portion 28 and is drawn out from the lower side toward the outer side of the third belt attachment portion 28 to bend upward as indicated by an arrow 65d, and again penetrates the through-hole of the second grip portion 17 surrounding the outer side (the right side) of the second belt attachment portion 17b as indicated by an arrow 65e to reach the belt adjuster 67 in parallel with the inner shoulder belt 65 as indicated by an arrow 65f. Here, the shoulder belt 65 is made to pass through the drawing ring 97 at the part of the arrow 65e. The drawing ring 97 serves as a part gripped by the operator during the caster movement, and the grip 69 shown in FIGS. 13 and 14 may be used therefor, or the drawing ring 97 may be formed of a belt with the same member as that of the shoulder belt 65. By arranging the drawing ring 97 in this manner, the drawing-out of the shoulder belt 65 becomes easy even if the interval between the second belt attachment portion 17 and the third belt attachment portion 28 is relatively small.

[0062] In (B) of FIG. 17, when the drawing ring 97 is drawn out from the state of (A) of FIG. 17, the part of the arrow 65a of the shoulder belt 65 moves in the direction of the arrow 96, and a looped part closer to the front end side than the belt adjuster 67 is drawn out in the direction of an arrow 98, that is, the direction of pulling by the user during the caster movement. Here, the arrows 65d and 65f of the shoulder belt 65 are pulled outward, but the drawing amount is limited by the contact of the shoulder belt 65 with the upper surface of the door portion 30 near the arrow 65a. Besides, depending on the attachment position of the belt adjuster 67, the drawing amount of the arrows 65d and 65f may be limited by the contact of the belt adjuster 67 with the second grip portion 17. As described above, in Example 2, the operator can perform the caster movement while holding the drawing ring 97. When returning to the shoulder mode from the state of (B) of FIG. 17, it is only necessary to lift up the vicinity of the arrow 65a of the shoulder belt 65, that is, the space between the belt adjusters 66 and 67, in the direction of an arrow 99, and thus a convenient cold storage container 1A can be achieved.

[0063] As described above, according to the second example, in addition to the first belt attachment portion 16b and the second belt attachment portion 17b, the third belt attachment portion 28 which is disposed with a predetermined distance below the second belt attachment portion 17b is arranged in the container portion 10A, and a part of the shoulder belt 65 which is bridged from the second belt attachment portion 17b to the third belt attachment portion 28 can be drawn outside. In addition, because the drawn-out belt part can be used for gripping during the caster movement, a portable cold storage container that is easy to use for both shoulder movement and caster movement can be achieved.

[0064] The portable cold storage container of the present invention is not limited to the above examples, and various modifications can be made within the scope of the invention described in the claims.

[Reference Signs List]

[0065]

1, 1A	cold and hot storage container (cold storage container)
10, 10A	container portion
11a	front wall portion
11b	rear wall portion
11c	right wall portion
11d	left wall portion
12a	opening
12b	bottom wall portion
13	accommodation space
14	convex portion
14a	recess
15	cord accommodation convex portion
16	first grip portion
16a	recess
16b	first belt attachment portion
17	second grip portion
17a	recess
17b	second belt attachment portion
18a, 18b	latch
19	hinge
20	battery accommodation chamber
21a	front wall portion
21b	rear wall portion
21c	upper side wall
21d	lower side wall
21e	right wall portion
21f	opening portion
22	operation display panel
23	power supply jack cover
24	cover
24a	pivot shaft
25a, 25b	battery attachment portion
26a	first latch
26b	second latch
27, 28	third belt attachment portion
30	door portion
31	outer wall
32	inner wall
32a	through-hole
32b	concave portion
32c	gap
33	heat insulating material
34a	convex portion
34d	attachment portion
35	air suction port
35a	slit
36	air discharge port
37	fan cover
41	arrangement portion (of heat exchange mechanism)
42	non-arrangement portion (of heat exchange mechanism)
43	stopper piece
43a	front side
44	pivot shaft
50	heat exchange mechanism
51	first Peltier element
51a, 52a	red cord
51b, 52b	black cord
51c, 51d, 52c, 52d	side (of Peltier element)

52	second Peltier element
53a	gap
54	outer heat sink
54a	base portion
54b	fin portion
55	outer fan
56	inner heat sink
56a	heat conductor
56b	base portion
56c	fin portion
57	interior fan (inner fan)
58	elastic body
59	cord group
61,62	battery
65	shoulder belt
66, 67	belt adjuster
68	shoulder pad
69	grip
69a	grip portion
69b	opening portion
69c	belt holding portion
69d	through-hole
69e	connection portion
70	control circuit board
71	power supply jack
72	charging circuit
73	charging control circuit
74	input detection
75	first relay switch
76	second relay switch
77	microcomputer
78	temperature sensor
80	DC-DC converter (first power supply unit)
81	DC-DC converter (one of second power supply unit)
82	DC-DC converter (the other of second power supply unit)
85	in-vehicle DC cord
85a	cigar socket
85b	terminal
86	AC-DC conversion adapter
86a	outlet
86b	adapter portion
86c	terminal
88a, 88b	caster
89a	rotary shaft
91, 93	interior temperature
92,94	voltage
97	drawing ring
101	cold storage container
110	container portion
116	first grip portion
117	second grip portion
120	battery accommodation chamber
130	door portion
132b	concave portion
150	heat exchange mechanism
151	Peltier element
151a	red cord
151b	black cord

154	outer heat sink
155	outer fan
157	interior fan
D1, D2	diode
M1-M6	switching element
R1-R5	resistor
AF1, AF2	airflow

Claims

1. A transportable cold storage container (1, 1A), comprising:

a container portion (10, 10A) that defines an interior in which an article is accommodated,
a door portion (30) that closes an opening (12a) of the container portion (10, 10A),
a plurality of Peltier elements (51, 52) that cools the interior,
an interior fan (57) that stirs air in the interior,
an outer fan (55) for cooling the Peltier elements (51, 52), and
a control unit that controls the Peltier elements (51, 52);
the transportable cold storage container (1, 1A) capable of being driven by a battery (61, 62) being attachable/detachable;
wherein the Peltier elements (51, 52) are driven by a first power supply unit (80), the interior fan (57) and the outer fan (55) are driven by a second power supply unit (81, 82), and the first power supply unit (80) and the second power supply unit (81, 82) are controlled independently of each other,
wherein an output voltage of the first power supply unit (80) or a voltage applied to the Peltier elements is configured to be changeable.

2. The transportable cold storage container (1, 1A) according to claim 1, wherein the second power supply unit (81, 82) is configured by two independent power supply units (81, 82), and the interior fan (57) and the outer fan (55) are driven independently.

3. The transportable cold storage container (1, 1A) according to claim 1 or 2, wherein two of the Peltier elements (51, 52) are disposed in the door portion (30), and one heat conductor (56a) and an inner fin (56c) that are in common contact with an inner surface side of the two of the Peltier elements (51, 52) are arranged, and the interior fan (57) is arranged to be adjacent to the inner fin (56c);
an outer fin (54b) that is in common contact with an outer surface side of the two of the Peltier elements (51, 52) is arranged, and the outer fan (55) is arranged to be adjacent to the outer fin (54b).

4. The transportable cold storage container (1, 1A) according to any one of claims 1 to 3, wherein in order to set the temperature of the interior to a target value, a first driving voltage being a rated voltage of a driving rate of the Peltier elements (51, 52) or close to the rated voltage and a second driving voltage lower than the first driving voltage are used, and temperature control for the interior is performed while switching between the first driving voltage, the second driving voltage and driving stop.

5. The transportable cold storage container (1, 1A) according to claim 4, comprising an external power supply part in addition to electric power supply using the battery (61, 62),
wherein the Peltier elements (51, 52) are driven by the first driving voltage when electric power is supplied from the external power supply.

6. The transportable cold storage container (1, 1A) according to claim 1 or 2, wherein the interior fan (57) is arranged on an inner side of the door portion (30),

the outer fan (55) is arranged on an outer side of the door portion (30),
the battery (61, 62) supplies electric power to the Peltier elements (51, 52), and
wherein two of the Peltier elements (51, 52) are arranged and are connected in parallel to a common power supply unit.

7. The transportable cold storage container (1, 1A) according to claim 6, wherein the container portion (10, 10A) has

an opening (12a) at the upper surface, the door portion (30) is a pivot door portion being horizontal in a closed state and has a substantially rectangular shape in a top view, a temperature sensor (78) that detects the temperature of the interior is arranged, two of the Peltier elements (51, 52) are arranged in parallel so that drawing directions of electric wires are opposite to each other; and
the control unit independently controls energization or cutoff of the two of the Peltier elements (51, 52) based on an output from the temperature sensor (78).

8. The transportable cold storage container (1, 1A) according to any one of claims 1 to 7, wherein a battery accommodation chamber (20) having a housing protruding to an outer part of the container portion (10, 10A) and capable of accommodating two of the batteries (61, 62) is disposed on a short side surface of the container portion (10, 10A).

9. The transportable cold storage container (1, 1A) according to any one of claims 1 to 8, comprising:

a caster (88a, 88b) arranged on one side of a bottom surface of the container portion (10, 10A),
a first belt attachment portion (16b) which is arranged on an outer edge portion of the opening (12a) of the container portion (10, 10A) and a side where the caster (88a, 88b) is located,
a second belt attachment portion (17b) which is arranged on an outer edge portion of the opening (12a) and a side opposite to the side where the caster (88a, 88b) is located, and
a belt (65) for shouldering being caused to pass through the first belt attachment portion (16b) and the second belt attachment portion (17b);
wherein a third belt attachment portion (27, 28) is arranged near the second belt attachment portion (17b);
the belt (65) is capable of selecting between a first attachment state in which the first belt attachment portion (16b) and the second belt attachment portion (17b) are used, and
a second attachment state, in which a part of the belt (65) is drawn out from the space between the second belt attachment portion (17b) and the third belt attachment portion (27, 28) by engaging the part of the belt (65) with the third belt attachment portion (27, 28), and thereby transport is possible while the caster (88a, 88b) is brought into contact with the ground and one side of the container portion (10, 10A) is floated.

10. The transportable cold storage container (1, 1A) according to claim 9, wherein a battery accommodation chamber (20) that accommodates the battery (61, 62) is arranged on an side surface on a side of the container portion (10, 10A) on which the third belt attachment portion (27, 28) is arranged.

11. The transportable cold storage container (1, 1A) according to any one of claims 1 to 10, comprising:

a pair of a caster (88a, 88b) arranged on one side of a bottom surface of the container portion (10, 10A), and
a grip portion (69a) arranged on an outer peripheral surface of the container portion (10, 10A) on other side opposite to the one side and gripped by an operator,
wherein the function of the caster (88a, 88b) is restricted in a state that the container portion (10, 10A) is placed horizontally, and the caster (88a, 88b) functions only in a state that the other side of the container portion (10, 10A) is floated.

12. The transportable cold storage container (1, 1A) according to any one of claims 1 to 11, wherein the Peltier elements (51, 52), the interior fan (57), the outer fan (55), and an outer heat sink (54) are arranged in the door portion (30), and an elastic body (58) is arranged in a gap between the outer heat sink (54) and a housing of the door portion (30).

13. The transportable cold storage container (1, 1A) according to claim 12, wherein the Peltier elements (51, 52), the interior fan (57), the outer fan (55), and the outer heat sink (54) are arranged on a side of the door portion (30) opposite to the caster (88a, 88b) and a side close to the battery accommodation chamber (20).

14. The transportable cold storage container (1, 1A) according to claim 8 or 10, wherein the battery accommodation chamber (20) has an opening portion (21f) for allowing the battery (61, 62) to be mounted inside, and a pivot cover (24) that closes the opening portion (21f), and
an axial direction of a rotary shaft (89a) of a caster (88a, 88b) arranged on a bottom surface of the container portion (10, 10A) and an axial direction of a pivot shaft (24a) of the cover (24) of the battery accommodation chamber (20) are disposed to intersect with each other.

15. The transportable cold storage container (1, 1A) according to any one of claims 9 to 11, wherein the belt (65) works to press the door portion (30) in the second attachment state.

Patentansprüche

1. Transportabler Kühlbehälter (1, 1A), umfassend:

einen Behälterteil (10, 10A), der einen Innenraum definiert, in dem ein Gegenstand untergebracht ist,
einen Türteil (30), der eine Öffnung (12a) des Behälterteils (10, 10A) verschließt,
eine Vielzahl von Peltier-Elementen (51, 52), die den Innenraum kühlt,
ein Innenraumventilator (57), das die Luft im Innenraum umwälzt,
ein Außenventilator (55) zur Kühlung der Peltier-Elemente (51, 52) und
eine Steuereinheit, die die Peltier-Elemente (51, 52) steuert;
wobei der transportable Kältespeicherbehälter (1, 1A) von einer Batterie (61, 62) angetrieben werden kann, die anbringbar/abnehmbar ist;
wobei die Peltier-Elemente (51, 52) von einer ersten Stromversorgungseinheit (80) angetrieben werden, der Innenraumventilator (57) und der Außenventilator (55) von einer zweiten Stromversorgungseinheit (81, 82) angetrieben werden, und die erste Stromversorgungseinheit (80) und die zweite Stromversorgungseinheit (81, 82) unabhängig voneinander gesteuert werden,
wobei eine Ausgangsspannung der ersten Stromversorgungseinheit (80) oder eine an die Peltier-Elemente angelegte Spannung konfiguriert ist, veränderbar zu sein.

2. Transportabler Kühlbehälter (1, 1A) gemäß Anspruch 1, wobei die zweite Stromversorgungseinheit (81, 82) durch zwei unabhängige Stromversorgungseinheiten (81, 82) konfiguriert ist, und der Innenraumventilator (57) und der Außenventilator (55) unabhängig voneinander angetrieben werden.

3. Transportabler Kühlbehälter (1, 1A) gemäß Anspruch 1 oder 2, wobei zwei der Peltier-Elemente (51, 52) in dem Türteil (30) angeordnet sind und ein Wärmeleiter (56a) und eine innere Rippe (56c), die in gemeinsamem Kontakt mit einer Innenflächenseite von den zweien der Peltier-Elemente (51, 52) stehen, angeordnet sind, und der Innenraumventilator (57) angeordnet ist, an die innere Rippe (56c) anzugrenzen;
eine äußere Rippe (54b), die in gemeinsamem Kontakt mit einer Außenflächenseite von den zweien der Peltier-Elemente (51, 52) steht, angeordnet ist, und der Außenventilator (55) angeordnet ist, an die äußeren Rippe (54b) anzugrenzen.

4. Transportabler Kühlbehälter (1, 1A) gemäß einem der Ansprüche 1 bis 3, wobei zum Einstellen der Temperatur des Innenraums auf einen Zielwert eine erste Steuerspannung, die eine Nennspannung einer Steuerungsrate der Peltier-Elemente (51, 52) oder nahe der Nennspannung ist, und eine zweite Steuerspannung, die niedriger als die erste Steuerspannung ist, verwendet werden, und Temperaturregelung für den Innenraum durchgeführt wird, während zwischen der ersten Steuerspannung, der zweiten Steuerspannung und Steuerstopp umgeschaltet wird.

5. Transportabler Kühlbehälter (1, 1A) gemäß Anspruch 4, umfassend ein externes Stromversorgungsteil zusätzlich zu elektrischer Energieversorgung über die Batterie (61, 62),
wobei die Peltier-Elemente (51, 52) durch die erste Steuerspannung angesteuert werden, wenn elektrische Energie von der externen Energieversorgung zugeführt wird.

6. Transportabler Kühlbehälter (1, 1A) gemäß Anspruch 1 oder 2, wobei der Innenraumventilator (57) an einer Innenseite des Türteils (30) angeordnet ist,

der Außenventilator (55) an einer Außenseite des Türteils (30) angeordnet ist,
die Batterie (61, 62) die Peltier-Elemente (51, 52) mit elektrischer Energie versorgt, und
wobei zwei der Peltier-Elemente (51, 52) angeordnet sind und parallel zu einer gemeinsamen Stromversorgungseinheit angeschlossen sind.

7. Transportabler Kühlbehälter (1, 1A) gemäß Anspruch 6, wobei der Behälterteil (10, 10A) eine Öffnung (12a) an der Oberseite aufweist, der Türteil (30) ein Schwenktürteil ist, der in einem geschlossenen Zustand horizontal ist und in einer Draufsicht eine im Wesentlichen rechteckige Form aufweist, ein Temperatursensor (78), der die Temperatur des Innenraums erfasst, angeordnet ist, zwei der Peltier-Elemente (51, 52) parallel angeordnet sind, so dass die Zugrichtungen der elektrischen Drähte einander entgegengesetzt sind; und
die Steuereinheit unabhängig Einschaltung oder Abschaltung von den zweien der Peltier-Elemente (51, 52) basierend auf einem Ausgangssignal des Temperatursensors (78) steuert.

8. Transportabler Kühlbehälter (1, 1A) gemäß einem der Ansprüche 1 bis 7, wobei eine Batterieaufnahmekammer (20) mit einem Gehäuse, das zu einem äußeren Teil des Behälterteils (10, 10A) vorsteht und zwei der Batterien (61, 62) aufnehmen kann, an einer kurzen Seitenfläche des Behälterteils (10, 10A) angeordnet ist.

9. Transportabler Kühlbehälter (1, 1A) gemäß einem der Ansprüche 1 bis 8, umfassend:

eine auf einer Seite einer Bodenfläche des Behälterteils (10, 10A) angeordnete Laufrolle (88a, 88b),
einen ersten Gurtbefestigungsteil (16b), der an einem Außenkantenteil der Öffnung (12a) des Behälterteils (10, 10A) und einer Seite, an der sich die Laufrolle (88a, 88b) befindet, angeordnet ist
einen zweiten Gurtbefestigungsteil (17b), der an einem Außenkantenteil der Öffnung (12a) und einer Seite angeordnet ist, die der Seite, an der sich die Laufrolle (88a, 88b) befindet, gegenüberliegt, und
einen Gurt (65) zum Schultern, der durch den ersten Gurtbefestigungsteil (16b) und den zweiten Gurtbefestigungsteil (17b) geführt wird;
wobei ein dritter Gurtbefestigungsteil (27, 28) Nahe dem zweiten Gurtbefestigungsteil (17b) angeordnet ist;
der Gurt (65) in der Lage ist, zu unterscheiden zwischen einem ersten Befestigungszustand, in dem der erste Gurtbefestigungsteil (16b) und der zweite Gurtbefestigungsteil (17b) verwendet werden, und
einem zweiten Befestigungszustand, in dem ein Teil des Gurts (65) aus dem Raum zwischen dem zweiten Gurtbefestigungsteil (17b) und dem dritten Gurtbefestigungsteil (27, 28) herausgezogen wird, indem der Teil des Gurts (65) mit dem dritten Gurtbefestigungsteil (27, 28) in Eingriff gebracht wird, und dadurch Transport möglich ist, während die Laufrolle (88a, 88b) in Kontakt mit dem Boden gebracht wird und eine Seite des Behälterteils (10, 10A) schwebt.

10. Transportabler Kühlbehälter (1, 1A) gemäß Anspruch 9, wobei eine Batterieaufnahmekammer (20), die die Batterie (61, 62) aufnimmt, an einer Seitenfläche auf einer Seite des Behälterteils (10, 10A) angeordnet ist, an der der dritte Gurtbefestigungsteil (27, 28) angeordnet ist.

11. Transportabler Kühlbehälter (1, 1A) gemäß einem der Ansprüche 1 bis 10, umfassend:

ein an einer Seite einer Bodenfläche des Behälterteils (10, 10A) angeordnetes Paar einer Laufrolle (88a, 88b), und
einen an einer äußeren Umfangsfläche des Behälterteils (10, 10A) auf der anderen, der einen Seite gegenüberliegenden Seite angeordneten und von einem Bediener gegriffenen Griffteil (69a),
wobei die Funktion der Laufrolle (88a, 88b) in einem Zustand, in dem der Behälterteil (10, 10A) horizontal platziert ist, eingeschränkt ist, und die Laufrolle (88a, 88b) nur in einem Zustand, das die andere Seite des Behälterteils (10, 10A) schwebend ist, funktioniert.

12. Transportabler Kühlbehälter (1, 1A) gemäß einem der Ansprüche 1 bis 11, wobei die Peltier-Elemente (51, 52), der Innenraumventilator (57), der Außenventilator (55) und ein Außenkühlkörper (54) in dem Türteil (30) angeordnet sind und ein elastischer Körper (58) in einem Spalt zwischen dem äußeren Kühlkörper (54) und einem Gehäuse des Türteils (30) angeordnet ist.

13. Transportabler Kühlbehälter (1, 1A) gemäß Anspruch 12, wobei die Peltier-Elemente (51, 52), der Innenraumventilator (57), der Außenventilator (55) und der Außenkühlkörper (54) auf einer Seite des Türteils (30) gegenüber der Laufrolle (88a, 88b) und einer Seite nahe der Batterieaufnahmekammer (20) angeordnet sind.

14. Transportabler Kühlbehälter (1, 1A) gemäß Anspruch 8 oder 10, wobei die Batterieaufnahmekammer (20) einen Öffnungsteil (21f), der es ermöglicht, die Batterie (61, 62) darin zu installieren, und eine Schwenkabdeckung (24), die den Öffnungsteil (21f) verschließt, aufweist, und
eine axiale Richtung einer Drehwelle (89a) einer auf einer Bodenfläche des Behälterteils (10, 10A) angeordneten Laufrolle (88a, 88b), und eine axiale Richtung einer Schwenkwelle (24a) des Deckels (24) der Batterieaufnahmekammer (20) angeordnet sind sich gegenseitig zu schneiden.

15. Transportabler Kühlbehälter (1, 1A) gemäß einem der Ansprüche 9 bis 11, wobei der Gurt (65) bewirkt, dass der Türteil (30) in den zweiten Befestigungszustand gedrückt wird.

Revendications

1. Conteneur frigorifique transportable (1, 1A), comprenant :

une partie conteneur (10, 10A) qui définit un intérieur dans lequel un article est logé,
une partie porte (30) qui ferme une ouverture (12a) de la partie conteneur (10, 10A),
une pluralité d'éléments Peltier (51, 52) qui refroidissent l'intérieur,
un ventilateur intérieur (57) qui brasse l'air dans l'intérieur,
un ventilateur extérieur (55) pour refroidir les éléments Peltier (51, 52), et
une unité de commande qui commande les éléments Peltier (51, 52) ;
le conteneur frigorifique transportable (1, 1A) pouvant être piloté par une batterie (61, 62) qui est attachable/détachable ;
dans lequel les éléments Peltier (51, 52) sont pilotés par une première unité d'alimentation électrique (80), le ventilateur intérieur (57) et le ventilateur extérieur (55) sont pilotés par une deuxième unité d'alimentation électrique (81, 82), et la première unité d'alimentation électrique (80) et la deuxième unité d'alimentation électrique (81, 82) sont commandées indépendamment l'une de l'autre,
dans lequel une tension de sortie de la première unité d'alimentation électrique (80) ou une tension appliquée aux éléments Peltier est configurée pour être modifiable.

2. Conteneur frigorifique transportable (1, 1A) selon la revendication 1, dans lequel la deuxième unité d'alimentation électrique (81, 82) est configurée par deux unités d'alimentation électrique indépendantes (81, 82), et le ventilateur intérieur (57) et le ventilateur extérieur (55) sont pilotés indépendamment.

3. Conteneur frigorifique transportable (1, 1A) selon la revendication 1 ou 2, dans lequel deux des éléments Peltier (51, 52) sont disposés dans la partie porte (30), et un conducteur de chaleur (56a) et une ailette intérieure (56c) qui sont en contact commun avec un côté surface intérieure desdits deux des éléments Peltier (51, 52) sont disposés, et le ventilateur intérieur (57) est disposé de manière à être adjacent à l'ailette intérieure (56c) ;
une ailette extérieure (54b) qui est en contact commun avec un côté surface extérieure desdits deux des éléments Peltier (51, 52) est disposée, et le ventilateur extérieur (55) est disposé de manière à être adjacent à l'ailette extérieure (54b).

4. Conteneur frigorifique transportable (1, 1A) selon l'une quelconque des revendications 1 à 3, dans lequel, afin de régler la température de l'intérieur à une valeur cible, on utilise une première tension de pilotage correspondant à une tension nominale d'un taux de pilotage des éléments Peltier (51, 52) ou proche de la tension nominale et une deuxième tension de pilotage inférieure à la première tension de pilotage, et la régulation de la température de l'intérieur est effectuée en commutant entre la première tension de pilotage, la deuxième tension de pilotage et un arrêt de pilotage.

5. Conteneur frigorifique transportable (1, 1A) selon la revendication 4, comprenant une partie alimentation électrique externe en plus de l'alimentation électrique utilisant la batterie (61, 62),
dans lequel les éléments Peltier (51, 52) sont pilotés par la première tension de pilotage lorsque l'alimentation électrique est fournie par l'alimentation électrique externe.

6. Conteneur frigorifique transportable (1, 1A) selon la revendication 1 ou 2, dans lequel le ventilateur intérieur (57) est disposé sur un côté intérieur de la partie porte (30),

le ventilateur extérieur (55) est disposé sur un côté extérieur de la partie porte (30),
la batterie (61, 62) fournit l'alimentation électrique aux éléments Peltier (51, 52), et
dans lequel deux des éléments Peltier (51, 52) sont disposés et connectés en parallèle à une unité d'alimentation électrique commune.

7. Conteneur frigorifique transportable (1, 1A) selon la revendication 6, dans lequel la partie conteneur (10, 10A) comporte une ouverture (12a) sur la surface supérieure, la partie porte (30) est une partie porte pivotante qui est horizontale dans un état fermé et a une forme sensiblement rectangulaire dans une vue de dessus, un capteur de température (78) qui détecte la température de l'intérieur est disposé, deux des éléments Peltier (51, 52) sont disposés en parallèle de sorte que les directions de tirage des fils électriques soient opposées l'une à l'autre ; et
l'unité de commande commande indépendamment l'activation ou la désactivation desdits deux des éléments Peltier (51, 52) sur la base d'une sortie du capteur de température (78).

8. Conteneur frigorifique transportable (1, 1A) selon l'une quelconque des revendications 1 à 7, dans lequel une chambre de logement de batterie (20) comportant un logement faisant saillie vers une partie extérieure de la partie conteneur (10, 10A) et pouvant loger deux des batteries (61, 62) est disposée sur une surface latérale courte de la partie conteneur (10, 10A).

9. Conteneur frigorifique transportable (1, 1A) selon l'une quelconque des revendications 1 à 8, comprenant :

une roulette (88a, 88b) disposée sur un côté de la surface inférieure de la partie conteneur (10, 10A),
une première partie d'attache de sangle (16b) qui est disposée sur une partie bord extérieur de l'ouverture (12a) de la partie conteneur (10, 10A) et sur un côté où la roulette (88a, 88b) est située,
une deuxième partie d'attache de sangle (17b) qui est disposée sur une partie bord extérieur de l'ouverture (12a) et sur un côté opposé au côté où la roulette (88a, 88b) est située, et
une sangle (65) pour la mise à l'épaule passant à travers la première partie d'attache de sangle (16b) et la deuxième partie d'attache de sangle (17b) ;
dans lequel une troisième partie d'attache de sangle (27, 28) est disposée près de la deuxième partie d'attache de sangle (17b) ;
la sangle (65) permet de choisir entre un premier état d'attache dans lequel la première partie d'attache de sangle (16b) et la deuxième partie d'attache de sangle (17b) sont utilisées, et
un deuxième état d'attache, dans lequel une partie de la sangle (65) est retirée de l'espace entre la deuxième partie d'attache de sangle (17b) et la troisième partie d'attache de sangle (27, 28) en mettant en prise la partie de la sangle (65) avec la troisième partie d'attache de sangle (27, 28), permettant ainsi le transport tandis que la roulette (88a, 88b) est mise en contact avec le sol et qu'un côté de la partie conteneur (10, 10A) est flottant.

10. Conteneur frigorifique transportable (1, 1A) selon la revendication 9, dans lequel une chambre de logement de batterie (20) qui loge la batterie (61, 62) est disposée sur une surface latérale sur un côté de la partie conteneur (10, 10A) sur lequel la troisième partie d'attache de sangle (27, 28) est disposée.

11. Conteneur frigorifique transportable (1, 1A) selon l'une quelconque des revendications 1 à 10, comprenant :

une paire de roulettes (88a, 88b) disposées sur un côté de la surface inférieure de la partie conteneur (10, 10A), et une partie poignée (69a) disposée sur une surface périphérique extérieure de la partie conteneur (10, 10A) sur l'autre côté opposé audit un côté et saisie par un opérateur,
dans lequel la fonction de la roulette (88a, 88b) est limitée dans un état où la partie conteneur (10, 10A) est placée horizontalement, et la roulette (88a, 88b) ne fonctionne que dans un état où l'autre côté de la partie conteneur (10, 10A) est flottant.

12. Conteneur frigorifique transportable (1, 1A) selon l'une quelconque des revendications 1 à 11, dans lequel les éléments Peltier (51, 52), le ventilateur intérieur (57), le ventilateur extérieur (55) et un dissipateur thermique extérieur (54) sont disposés dans la partie porte (30), et un corps élastique (58) est disposé dans un espace entre le dissipateur thermique extérieur (54) et un boîtier de la partie porte (30).

13. Conteneur frigorifique transportable (1, 1A) selon la revendication 12, dans lequel les éléments Peltier (51, 52), le ventilateur intérieur (57), le ventilateur extérieur (55) et le dissipateur thermique extérieur (54) sont disposés sur un côté de la partie porte (30) opposé à la roulette (88a, 88b) et un côté proche de la chambre de logement de batterie (20).

14. Conteneur frigorifique transportable (1, 1A) selon la revendication 8 ou 10, dans lequel la chambre de logement de batterie (20) comporte une partie ouverture (21f) pour permettre à la batterie (61, 62) d'être montée à l'intérieur et un couvercle pivotant (24) qui ferme la partie ouverture (21f), et
une direction axiale d'un arbre rotatif (89a) d'une roulette (88a, 88b) disposée sur une surface inférieure de la partie conteneur (10, 10A) et une direction axiale d'un arbre de pivotement (24a) du couvercle (24) de la chambre de logement de batterie (20) sont disposées de manière à se croiser l'une l'autre.

15. Conteneur frigorifique transportable (1, 1A) selon l'une quelconque des revendications 9 à 11, dans lequel la sangle (65) fonctionne de manière à presser la partie porte (30) dans le deuxième état d'attache.

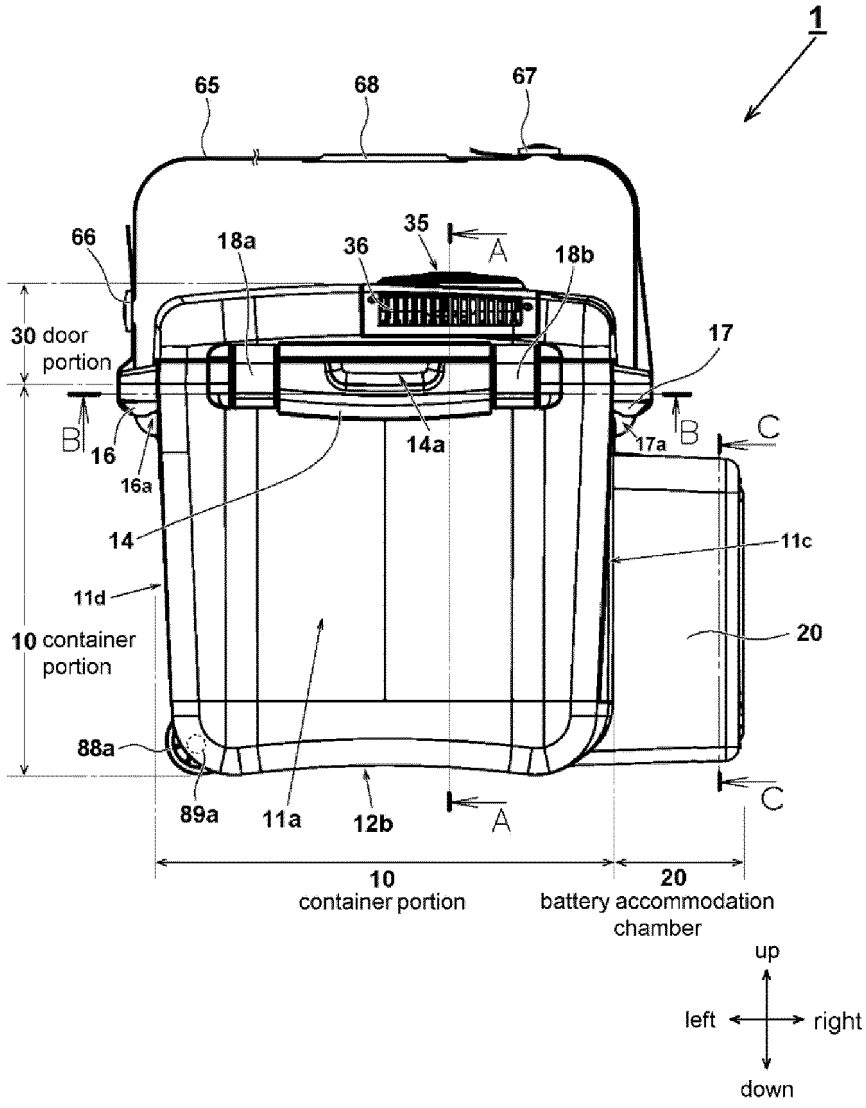

1
65
68
67
66
18a
36
35
A
18b
17
30 door portion
B
16
16a
14a
17a
B
C
14
11c
11d
10 container portion
20
88a
89a
11a
12b
A
C
10
container portion
20
battery accommodation chamber
up
left
right
down

FIG. 1

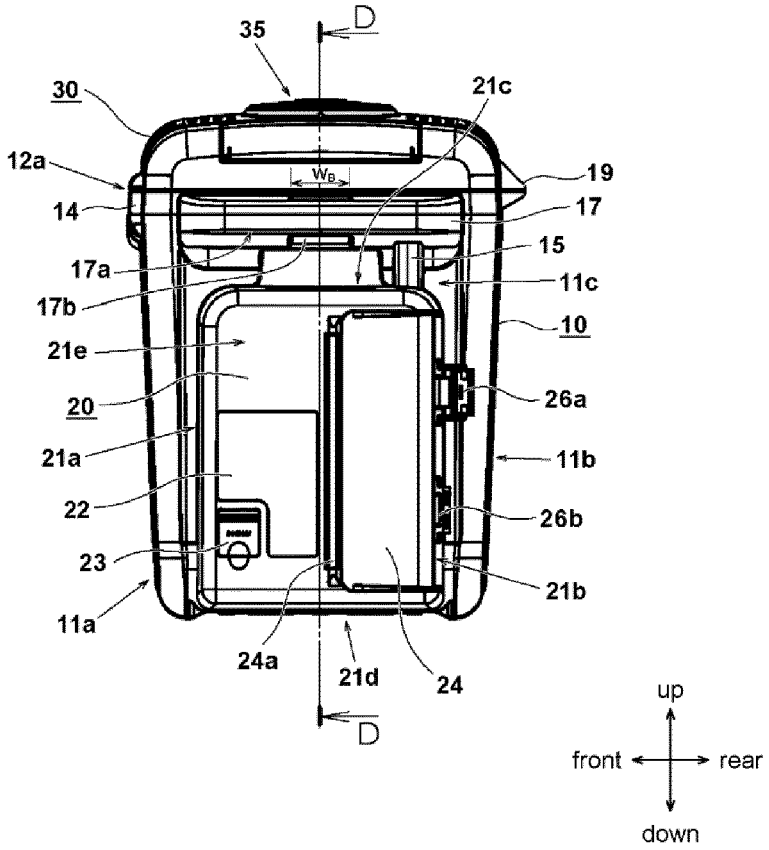

35
D
30
21c
12a
19
W_B
14
17
17a
15
11c
17b
10
21e
20
26a
21a
11b
22
26b
23
21b
11a
24a
21d
24
D
up
front
rear
down

FIG. 2

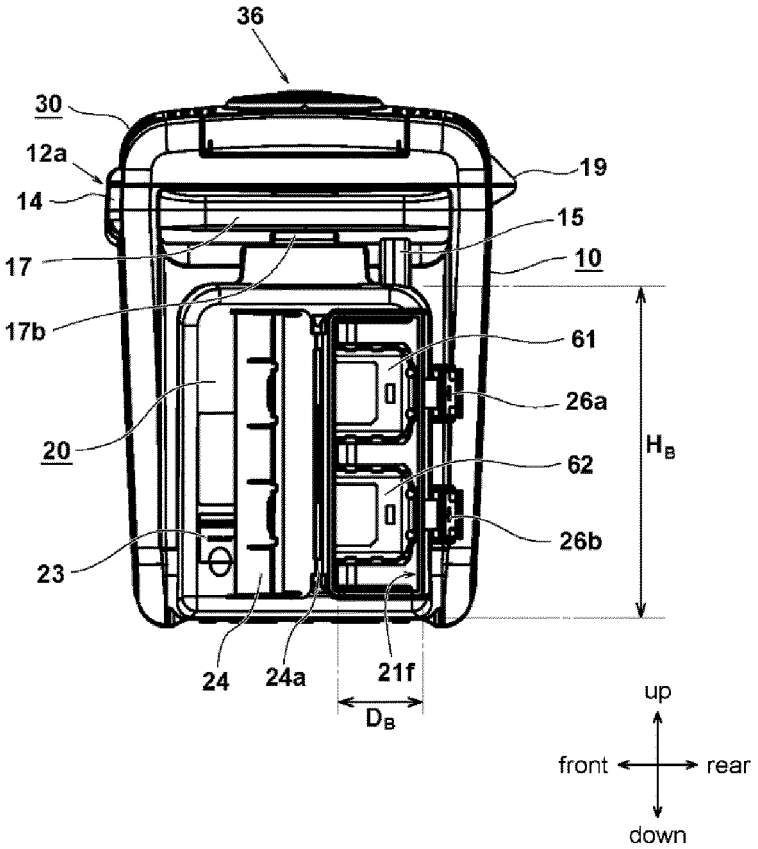

36
30
12a
14
19
15
17
10
17b
61
26a
20
H_B
62
26b
23
24
24a
21f
D_B
up
front
rear
down

FIG. 3

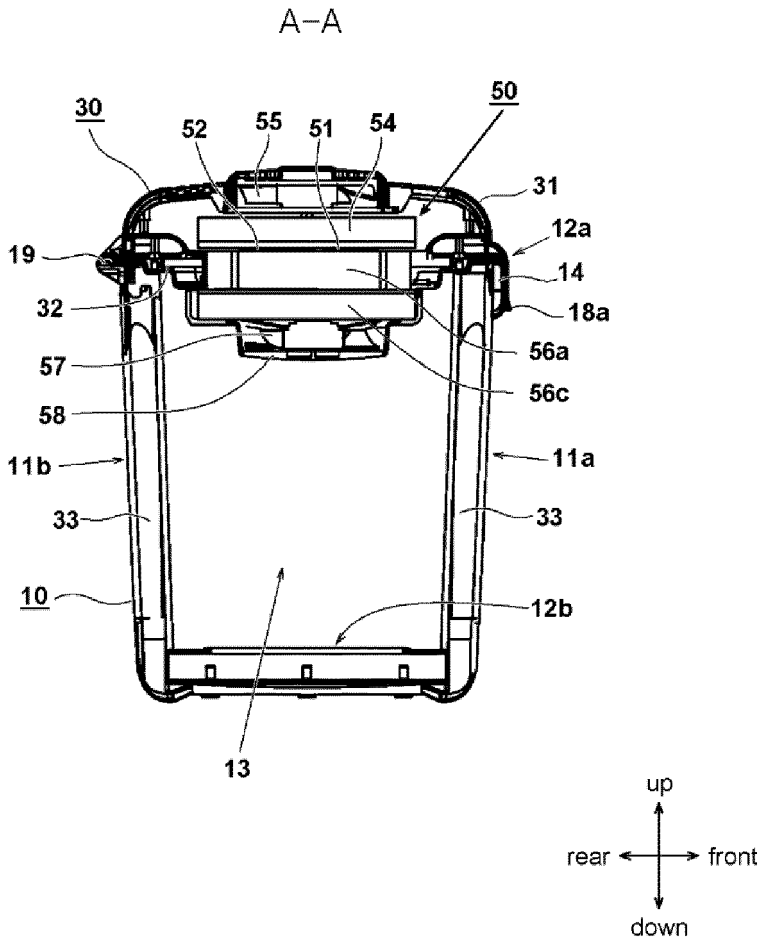

A–A
30
52
55
51
54
50
31
12a
19
14
32
18a
56a
57
56c
58
11a
11b
33
33
10
12b
13
up
rear
front
down

FIG. 4

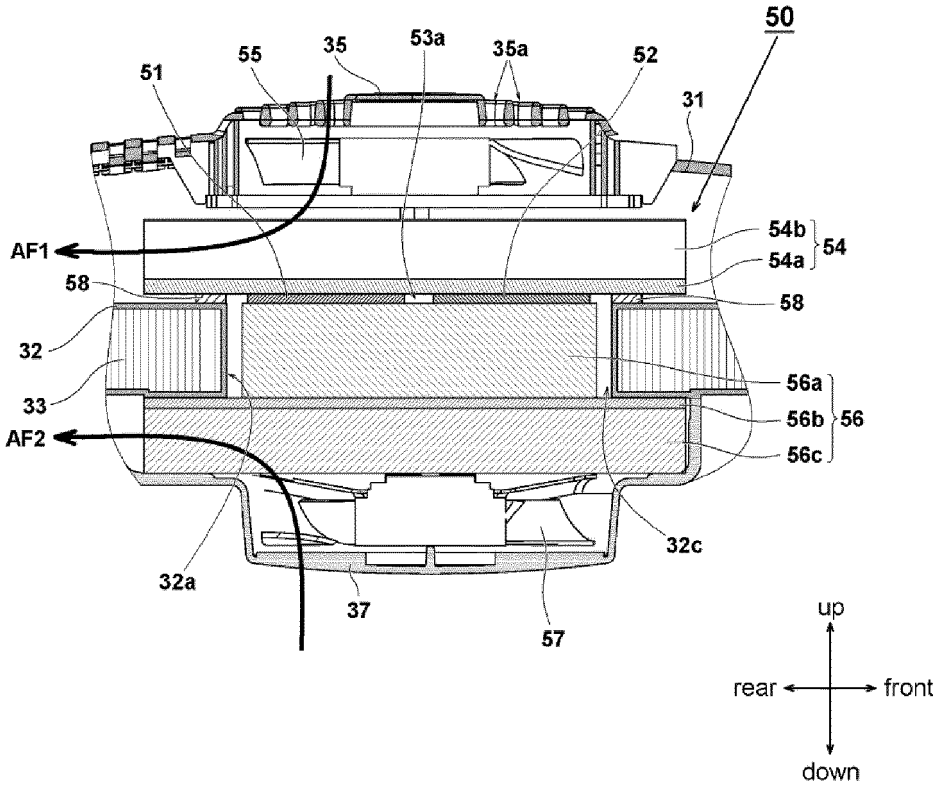

50
55
35
53a
35a
52
51
31
AF1
54b
54a
54
58
58
32
56a
33
56b
56
AF2
56c
32c
32a
37
57
up
rear
front
down

FIG. 5

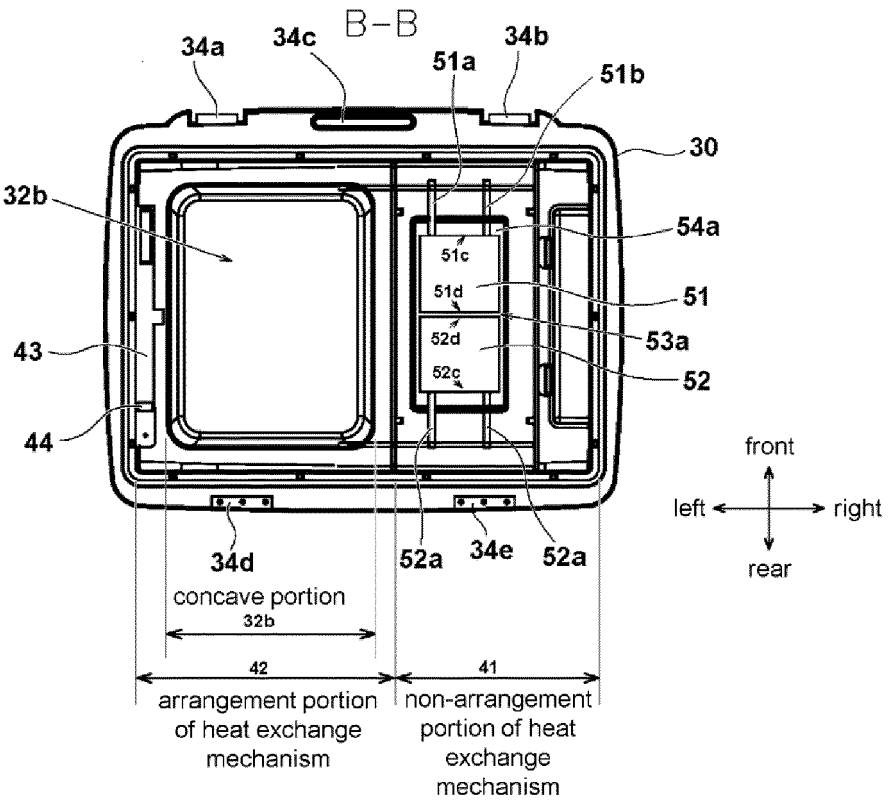

B-B
34a
34c
34b
51a
51b
30
32b
54a
51c
51d
51
52d
53a
52c
52
43
44
front
left
right
rear
34d
52a
34e
52a
concave portion
32b
42
41
arrangement portion of heat exchange mechanism
non-arrangement portion of heat exchange mechanism

FIG. 6

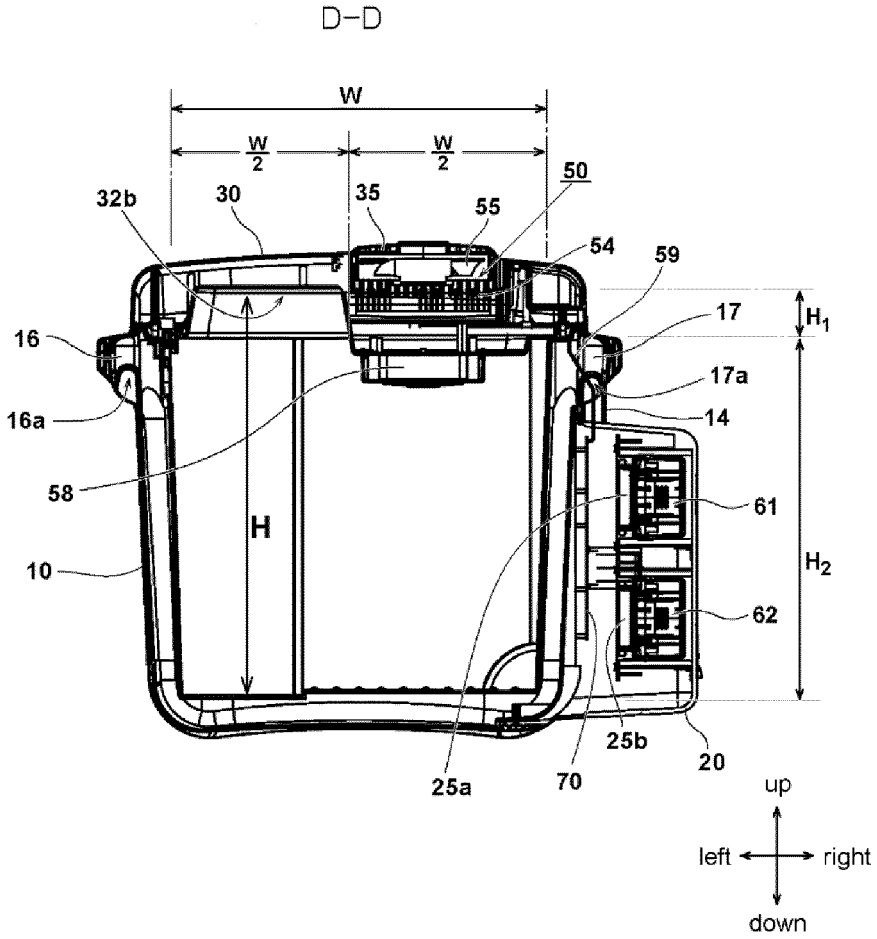

D-D
W
W/2
W/2
50
32b
30
35
55
54
59
17
H1
16
17a
16a
14
58
H
61
10
H2
62
25b
20
25a
70
up
left
right
down

FIG. 7

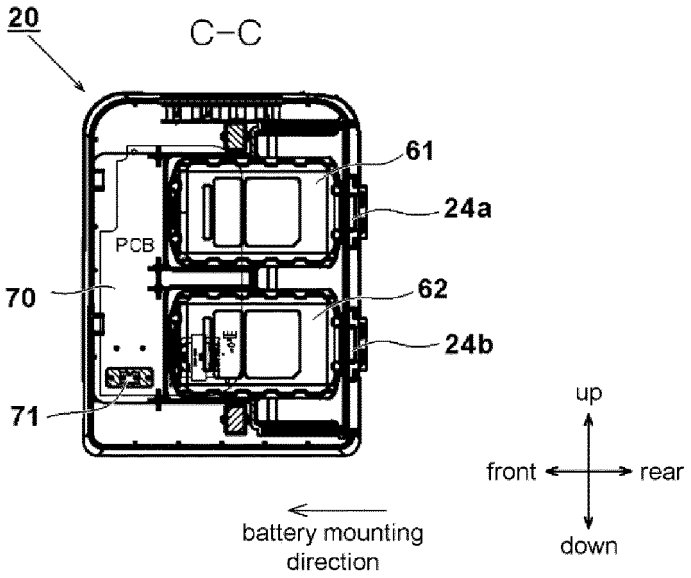

20
C–C
61
24a
PCB
70
62
24b
71
up
front
rear
down
battery mounting
direction

FIG. 8

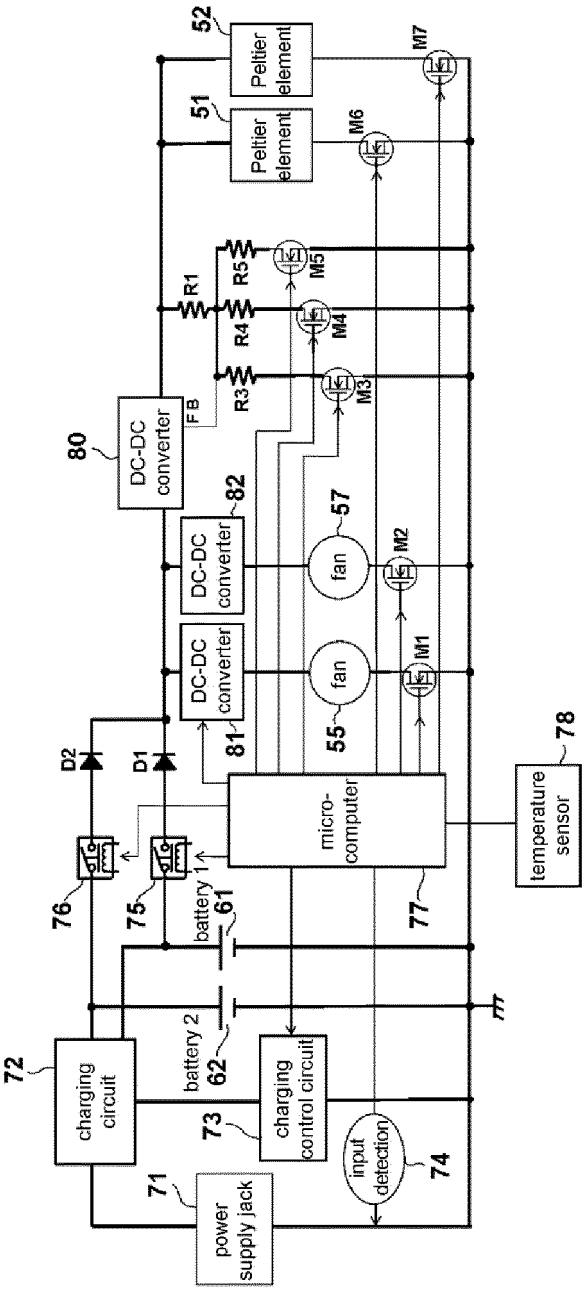

52
Peltier element
51
Peltier element
M7
M6
R1
R5
M5
R4
M4
R3
M3
80
DC-DC converter
FB
82
DC-DC converter
57
fan
M2
DC-DC converter
fan
M1
81
55
D2
D1
micro-computer
78
temperature sensor
76
75
battery 1
61
77
battery 2
62
72
charging circuit
charging control circuit
73
input detection
74
71
power supply jack

FIG. 9

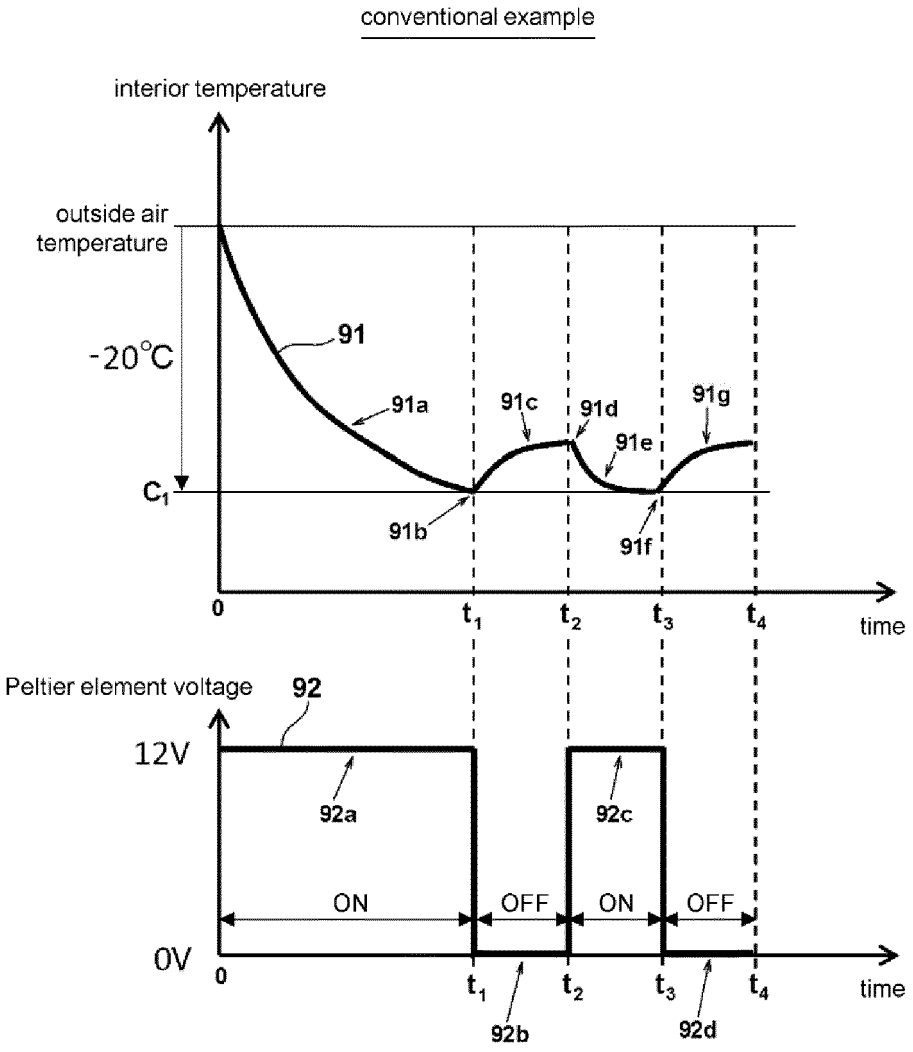

conventional example
interior temperature
outside air temperature
-20°C
C1
91
91a
91b
91c
91d
91e
91f
91g
0
t1
t2
t3
t4
time
Peltier element voltage
92
12V
0V
92a
92b
92c
92d
ON
OFF
ON
OFF
0
t1
t2
t3
t4
time

FIG. 10

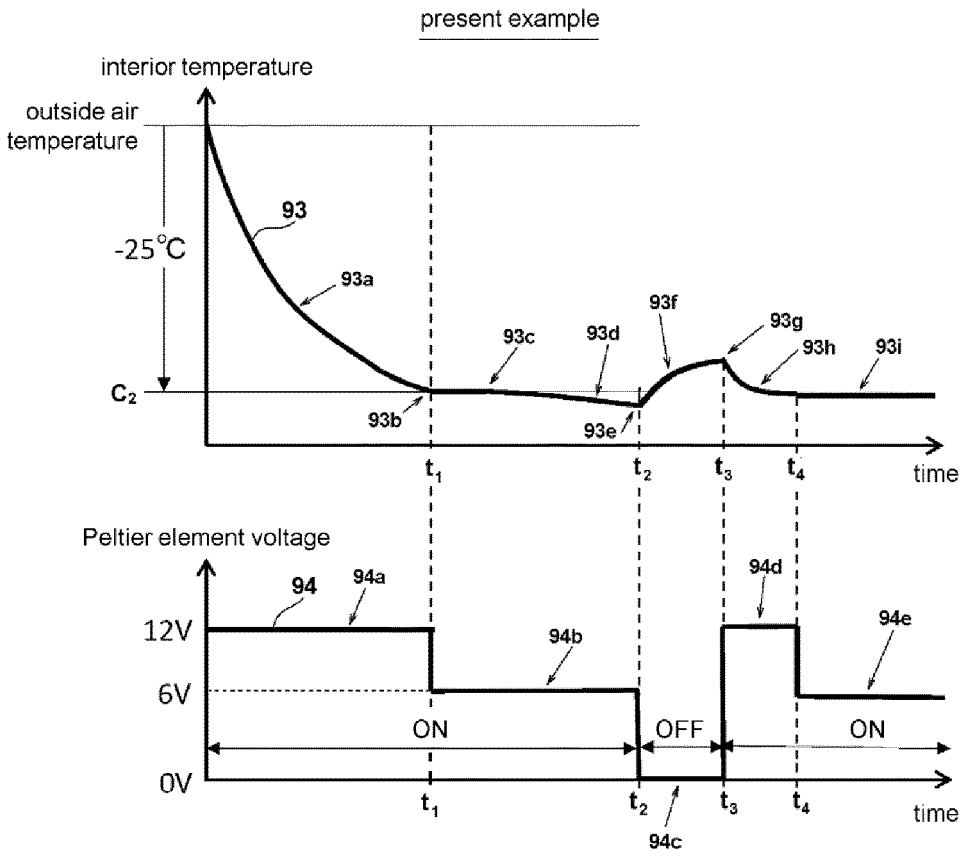

present example
interior temperature
outside air temperature
-25°C
C2
93
93a
93b
93c
93d
93e
93f
93g
93h
93i
t1
t2
t3
t4
time
Peltier element voltage
12V
6V
0V
94
94a
94b
94c
94d
94e
ON
OFF
ON
t1
t2
t3
t4
time

FIG. 11

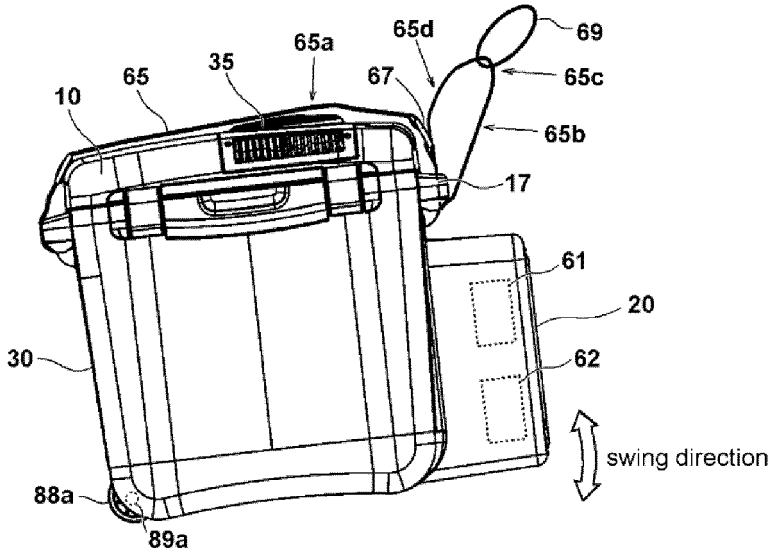

65a
65d
69
35
65
67
65c
10
65b
17
61
20
30
62
swing direction
88a
89a

FIG. 12

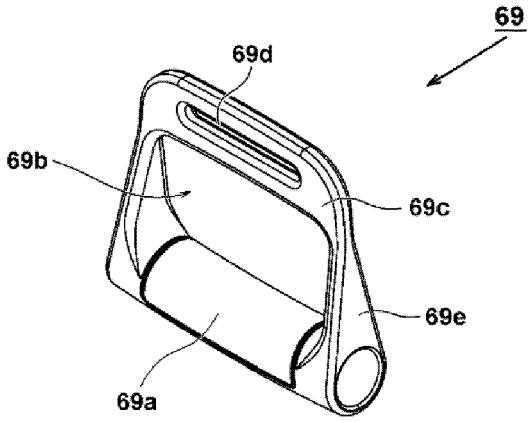

69
69d
69b
69c
69e
69a

FIG. 13

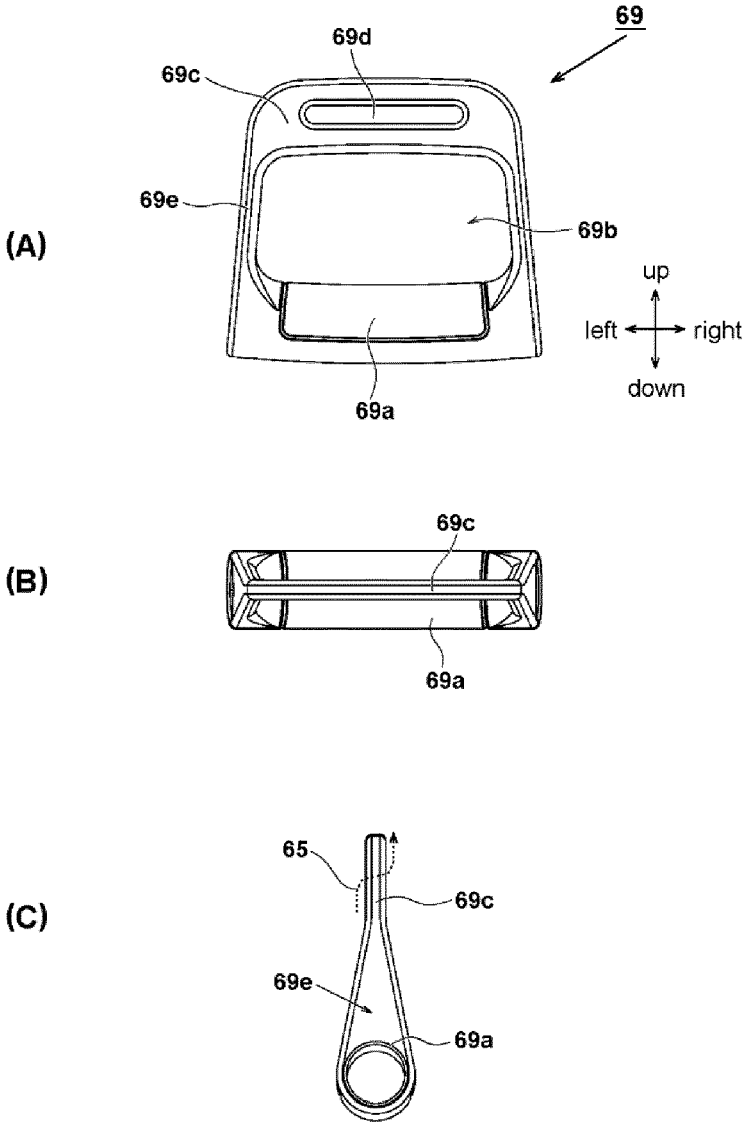

(A)
69
69d
69c
69e
69b
up
left
right
down
69a
(B)
69c
69a
(C)
65
69c
69e
69a

FIG. 14

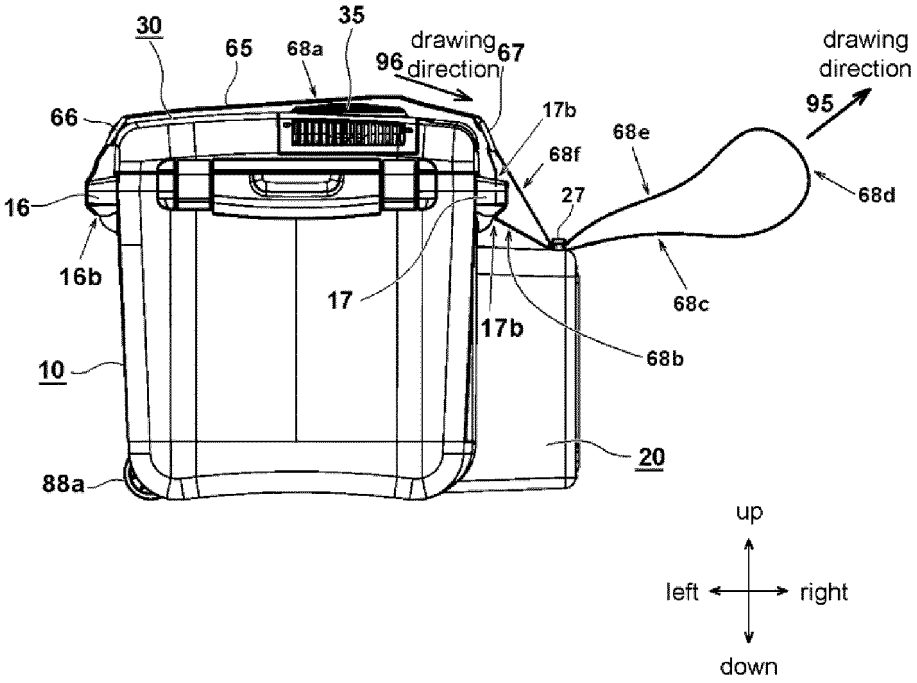
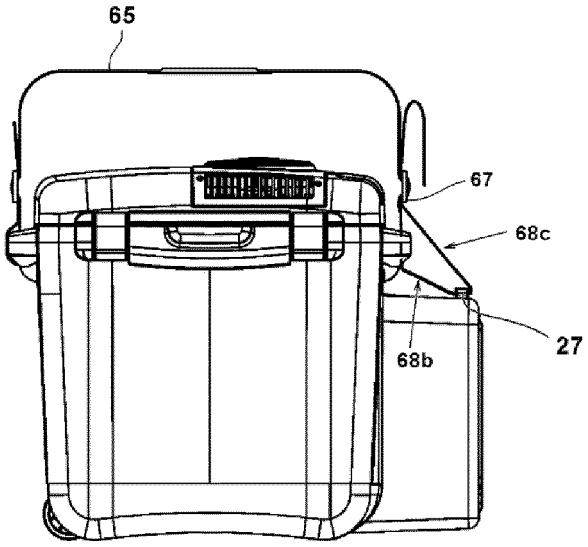

30
65
68a
35
drawing direction
96
67
drawing direction
95
66
17b
68e
68f
27
68d
16
16b
17
17b
68c
68b
10
20
88a
up
left
right
down

FIG. 15

(A)


65
67
68c
27
68b

(B)

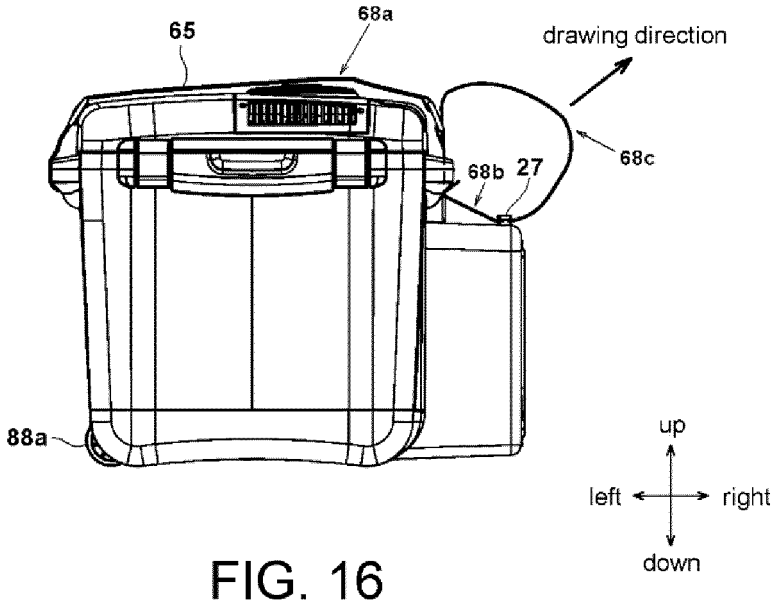

65
68a
drawing direction
68c
68b
27
88a
up
left
right
down

FIG. 16

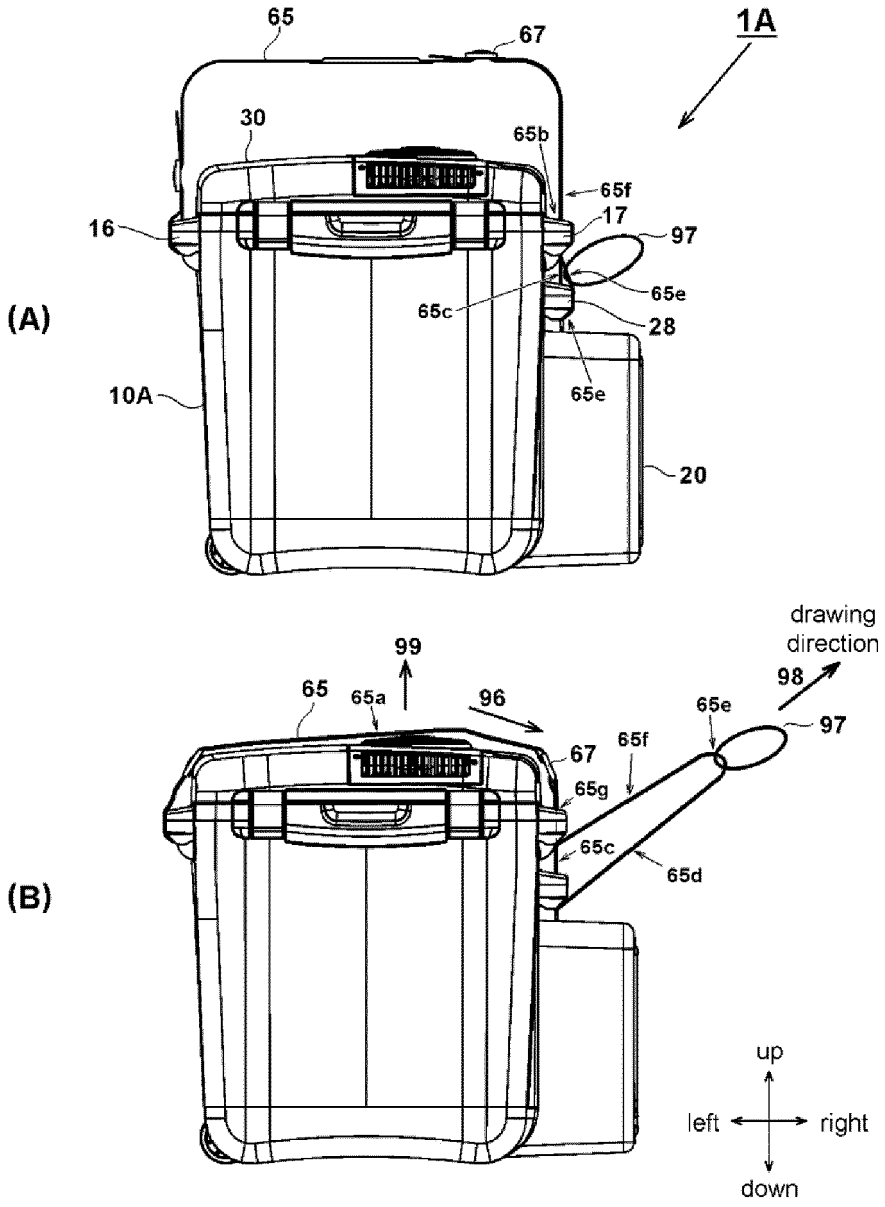

(A)
1A
65
67
30
65b
65f
17
97
16
65e
65c
28
65e
10A
20
(B)
drawing direction
99
98
65
65a
96
65e
97
65f
67
65g
65c
65d
up
left
right
down

FIG. 17

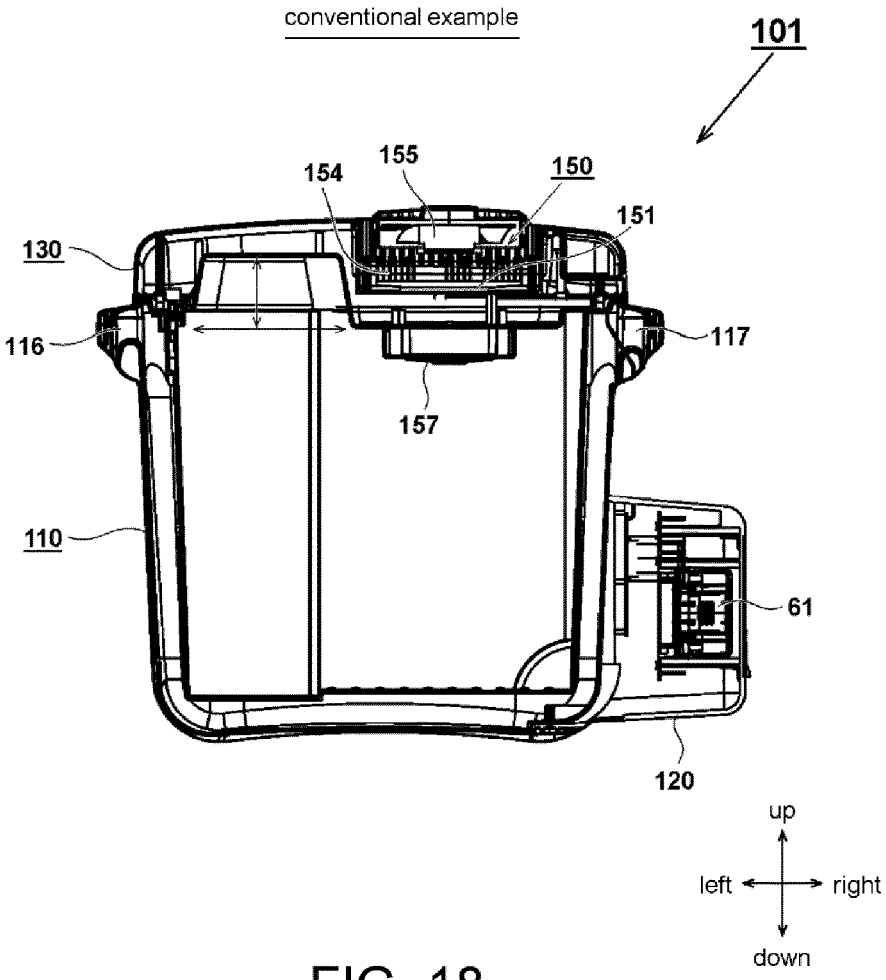

conventional example
101
155
154
150
151
130
116
117
157
110
61
120
up
left
right
down

FIG. 18

conventional example

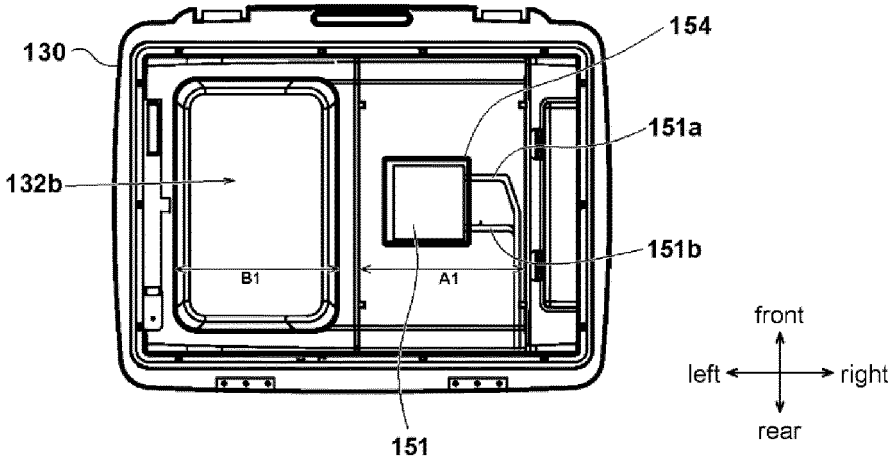


FIG. 19

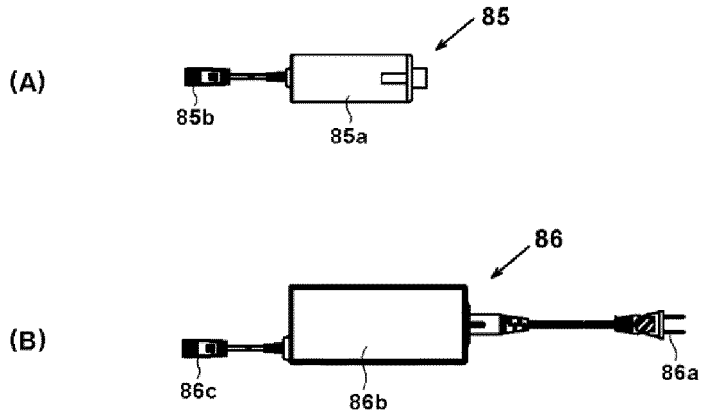


FIG. 20

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2017122521 A **[0004]**
- JP 20010165548 A **[0004]**