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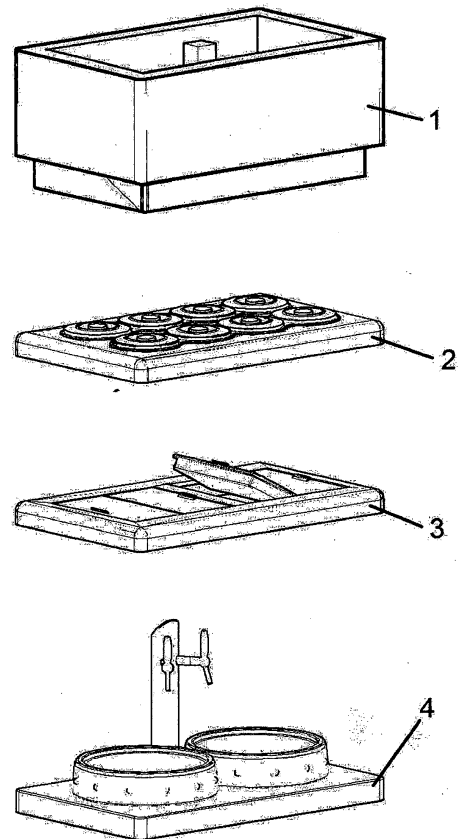
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(54) **TRANSPORTABLE MULTI-TEMPERATURE DIRECT CURRENT REFRIGERATOR**

(57) A transportable direct current refrigerator for storing and dispensing different foodstuff is described, comprising an insulated container (1), a plurality of interchangeable insulated covers (2, 3, 4) adapted to dispense different foodstuff, an electric refrigerating unit (5) for thermally conditioning the container (1), one or more batteries (6) for autonomously supplying the refrigerating unit (5), and electronic control means of the refrigerating unit (5), for detecting and keeping the internal temperature of the container at pre-defined values associated with the type of foodstuff being contained.

Fig. 1



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Description

[0001] The present invention deals with a refrigerator operating with a battery with wide versatility, aimed to contain foodstuff which can require different storage and dispensing temperatures.

[0002] Portable refrigerators are currently known, which are composed of a refrigerating unit, generally supplied with batteries, aimed to transport and dispense foodstuffs. These refrigerators are known, for example, from US-A-3866433, JP-A-H11-325710, JP-A-2001-324253 and JP-A-2002-225763.

[0003] According to the type of food which must be delivered, home-made or industrial ice-creams, beverages or other, known refrigerators are designed to keep, for a certain number of hours, an optimum temperature for the transported foodstuff, and are equipped with suitable openings to provide access to the refrigerated container.

[0004] Portable refrigerators are also known, which are simultaneously equipped with openings for containing and dispensing ice and beverages, or also spilled beverages.

[0005] A system of this type is disclosed in US5915602.

[0006] Since every type of product has its own optimum storage temperature and its overall sizes, known portable refrigerators have however the inconvenience of being limited to a single type of product, or of having to use a temperature which is not optimum for all contained products, or still more of having to be structured with insulated compartments, equipped with specific thermal regulations.

[0007] For example, the use of door-type openings is necessary for dispensing industrial ice-creams, but implies a damaging clod dispersion in case of home-made ice-creams, for which it is preferable to use "carapina" (steel containers for preparing ice-creams).

[0008] Moreover, known mobile refrigerators, due to their being rigid to use, do not allow dispensing, with the same means of transport, foodstuff which are also mutually very different.

[0009] The need is therefore felt for a portable, battery-type refrigerator with a flexible use and long working life, suitable for storing and dispensing different foodstuff, such as home-made or industrial ice-creams, or beverages, with different storage temperatures and different dispensing modes.

[0010] This and other objects of the present invention are reached with a mobile refrigerator according to any one of the enclosed claims.

[0011] It is intended that all enclosed claims are an integral part of the present description.

[0012] The obtained advantages consist in the chance of easily changing the type of stored and dispensed food, keeping for each one of them the best storage conditions and anyway guaranteeing a high autonomy.

[0013] The enclosed drawings schematically show

preferred examples of the invention, in which:

- Figure 1 shows an insulated container which can be associated with different types of insulated covers according to the invention;
- Figure 2 schematically shows a refrigerating unit of a mobile refrigerator according to the invention;
- Figure 3 schematically shows the components of a refrigerator according to the invention;
- Figure 4 shows with a front and side view a possible configuration of the refrigerator with carapina-type cover;
- Figures 5a, 5b and 5c schematically show means of transport equipped with a refrigerator according to the invention;
- Figure 6 schematically shows the components and the operation of the electric part;
- Figure 7 shows the battery-charger of the refrigerating unit; and
- Figure 8 schematically shows the components of the refrigerating plant.

[0014] With reference to the enclosed drawings, a transportable refrigerator is described, comprising an insulated container 1 which can be associated with many interchangeable insulated covers 2, 3, 4 suitable for dispensing different foodstuff.

[0015] Within the present invention, the term "interchangeable cover" means covers which can be easily replaced manually one with the other, without using specific mechanical tools or other types.

[0016] Preferably, the insulated covers 2-4 comprise a cover 2 for storing and dispensing loose ice-cream or crushed-ice drinks in carapinas, a door-type cover 3 for storing and dispensing industrial ice-creams or beverages and other foodstuff, and finally a cover 4 for storing and dispensing beer or beverages in drums.

[0017] It is anyway intended that other types of interchangeable covers could also be provided.

[0018] The internal temperature of the container 1 is taken and kept at the desired values through an electric refrigerating unit 5, preferably composed of a refrigerating unit with vented condensation, operating with direct current, preferably at 24 V, supplied by one or more accumulators 6 capable of autonomously supply the unit 5.

[0019] According to the invention, the unit 5 is controlled by electronic control means arranged to detect and keep the internal container temperature at predefined values associated with the type of foodstuff being contained. For example, for a home-made ice-cream -12°C; a packaged industrial ice-cream -18°C; beverages +4°C.

[0020] Preferably, the container 1 can further comprise one or more separators to define internal compartments having different temperatures.

[0021] In such case, the electronic control can comprise different temperature detecting sensors and compartment cooling circuits which are separately controlled.

[0022] In different embodiments of the invention, the

container 1 and the refrigerating unit 5 can be integrated in a single, autonomous body, which can be used in fixed locations 7 and/or on different mobile structures, thereby obtaining a single body without integration onto a means of transport (Figures 3 and 4), or be separate and integrated in the structure of a means of transport 8 (Figures 5a, 5b, 5c) being housed in different spaces suitable for maintaining the homologation of the same means.

[0023] Figure 6 schematically shows the electric plant of the refrigerating apparatus.

[0024] Such electric plant substantially comprises: a plug 10 for recharging the accumulators 6; batteries 11, 12 of an AGM type, for supplying the electric plant, connected to the plug 10; a DC airtight compressor 13 connected to the batteries 11, 12; fans 14, 15 for the condenser connected to the compressor 13; a control panel 21 for the electric plant, connected to the compressor 13; a fan 16 placed inside the tank and connected to the panel 21; a LED-type illuminating lamp 17 connected to the panel 21; a control push-button 18 for water delivery connected to the panel 21; a pump 19 for water delivery connected to the panel 21; and a probe 20 for the temperature thermostat of the tank connected to the panel 21.

[0025] Figure 7 shows the device for recharging the accumulators 6 of the refrigerator, which comprises a plug 22 for recharging the accumulators 6; a plug 23 for the electric mains; and a battery-charger 24 connected to both plugs 22 and 23.

[0026] Finally, Figure 8 schematically shows the electric refrigerating unit 5, which comprises: a DC airtight compressor 25; a condenser 64 of the lamellar type with forced cooling connected to the compressor 25; a filter 27 for impurities connected to the condenser 64; an expansion valve 28 connected to the filter 27; and an evaporator 29 with internal serpentine for the tank connected to the expansion valve 28 and to the compressor 25.

[0027] The invention obtains important advantages.

[0028] With the adopted solution, it is possible to store and dispense, with the same refrigerator, different foodstuff, which require different temperatures and different dispensing modes. Moreover, the same refrigerator can be separable from the supporting structure to be assembled without modifications on different means of transport or locations, or be integrated in a means of transport, for example an electric means.

Claims

1. Transportable direct current refrigerator for storing and dispensing different foodstuff, comprising :

an insulated container (1),
a plurality of interchangeable insulated covers (2, 3, 4) adapted to dispense different foodstuff,
an electric refrigerating unit (5) for thermally conditioning the container (1),

one or more accumulators (6) for autonomously supplying the refrigerating unit (5),
electronic control means of the refrigerating unit (5), for detecting and keeping the internal temperature of the container at predefined values associated with the type of foodstuff being contained, the electronic control means being associated with an electric plant,
wherein the container comprises a separator for defining compartments with different temperatures, and the insulated covers (2-4) comprise, interchangeably, a cover (2) for storing and dispensing home-made ice-cream or crushed-ice drinks in carapinas, a door-type cover (3) for storing and dispensing industrial packaged ice-cream or beverages, or a cover (4) for storing and dispensing beer or beverages in drums,
characterized in that the electric plant comprises:

- a plug (10) for recharging the accumulators (6);
- batteries (11, 12) of the AGM type, for supplying the electric plant, connected to the plug (10);
- a DC airtight compressor (13) connected to the batteries (11, 12);
- fans (14, 15) for the condenser connected to the compressor (13);
- a control panel (21) for the electric plant, connected to the compressor (13);
- a fan (16) placed inside the tank and connected to the panel (21);
- a LED-type illuminating lamp (17) connected to the panel (21);
- a control push-button (18) for delivering water connected to the panel (21);
- a pump (19) for delivering water connected to the panel (21); and
- a probe (20) for the temperature thermostat of the tank connected to the panel (21).

2. Refrigerator according to claim 1, **characterized in that** it further comprises a device for recharging the accumulators (6) comprising: a plug (22) for recharging the accumulators (6); a plug (23) for the electric mains; and a battery-charger (24) connected to both plugs (22, 23).

3. Refrigerator according to claim 1 or 2, **characterized in that** the electric refrigerating unit (5) comprises:

- a DC airtight compressor (25);
- a condenser (64) of the lamellar type with forced cooling connected to the compressor (25);
- a filter (27) for impurities connected to the condenser (64);

- an expansion valve (28) connected to the filter (27); and
 - an evaporator (29) with internal serpentine for the tank connected to the expansion valve (28) and to the compressor (25). 5
4. Refrigerator according to any one of the previous claims, comprising an internal device with air re-circulation. 10
 5. Refrigerator according to any one of the previous claims, wherein the refrigerating unit comprises a refrigerating unit with vented condensing, operating with direct current, preferably at 24 V, delivered by one or more accumulators (6). 15
 6. Refrigerator according to any one of the previous claims, wherein the container and the refrigerating unit are integrated in a single, autonomous mobile body, which can be used in fixed locations and/or on different mobile structures. 20
 7. Refrigerator according to any one of the previous claims 1 to 5, wherein the container and the refrigerating unit are separate and integrated in the structure of a means of transport. 25
 8. Electrically powered vehicle integrated with a refrigerator according to claim 7. 30
 9. Vehicle according to claim 8, comprising separate accumulators dedicated to its traction.
 10. Tricycle with a refrigerator according to claim 7. 35

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Fig. 1

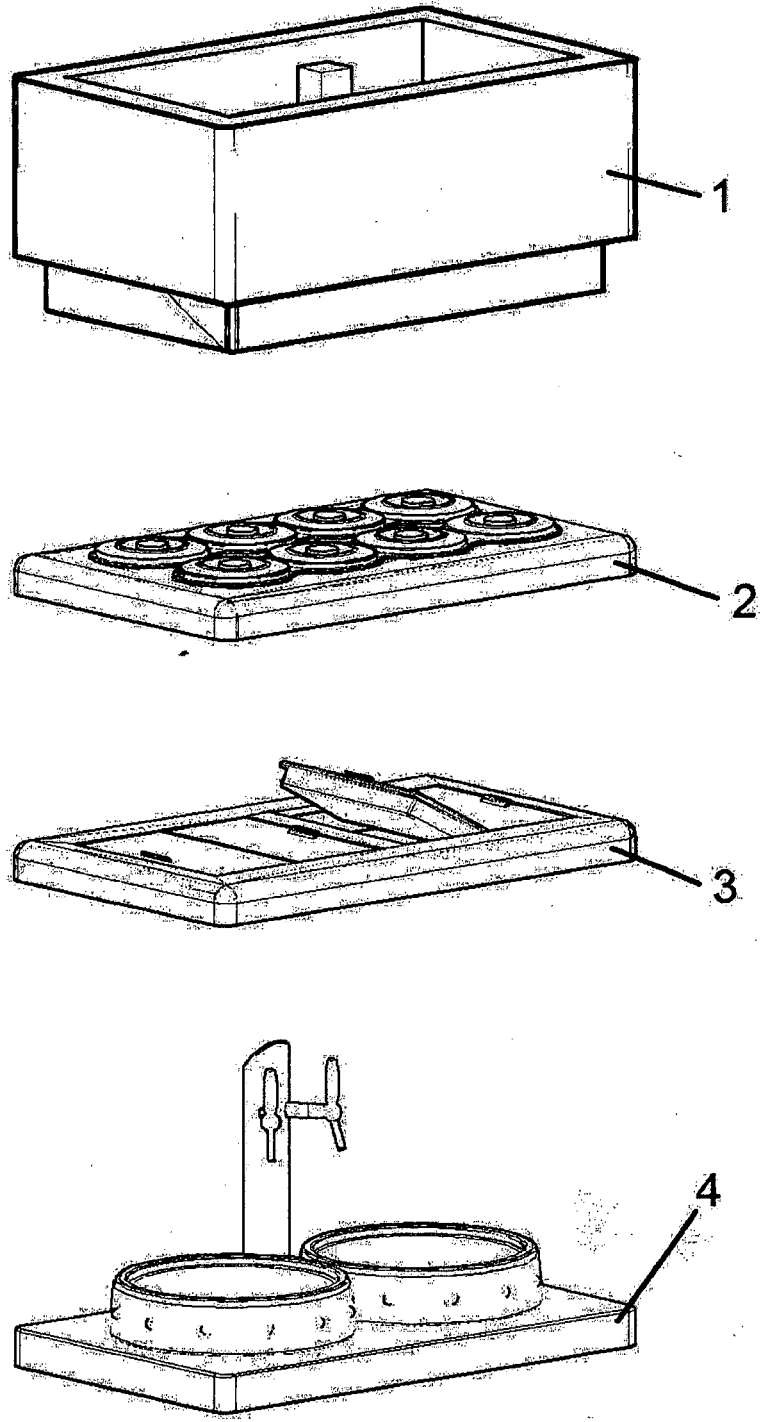


Fig. 2

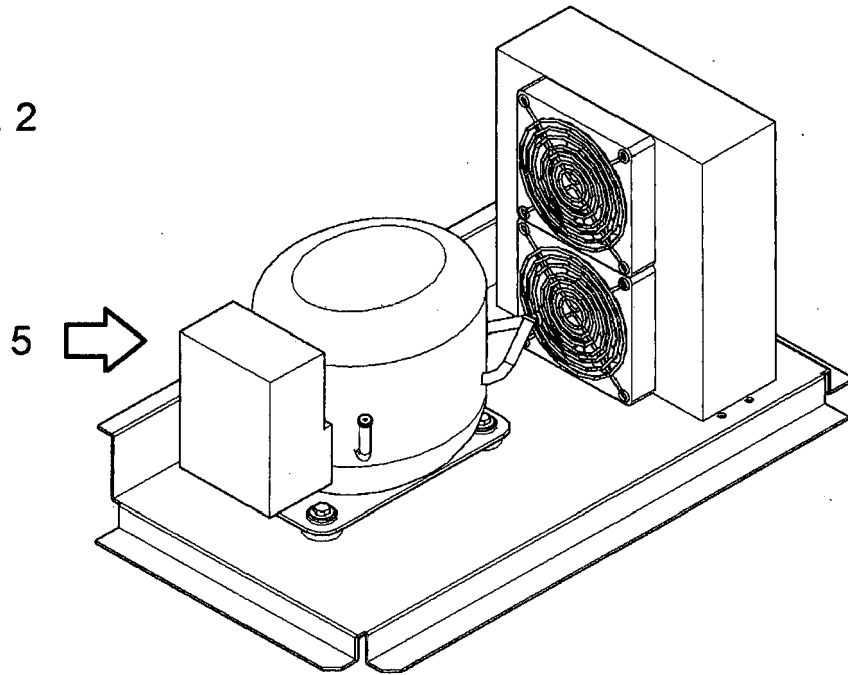


Fig. 3

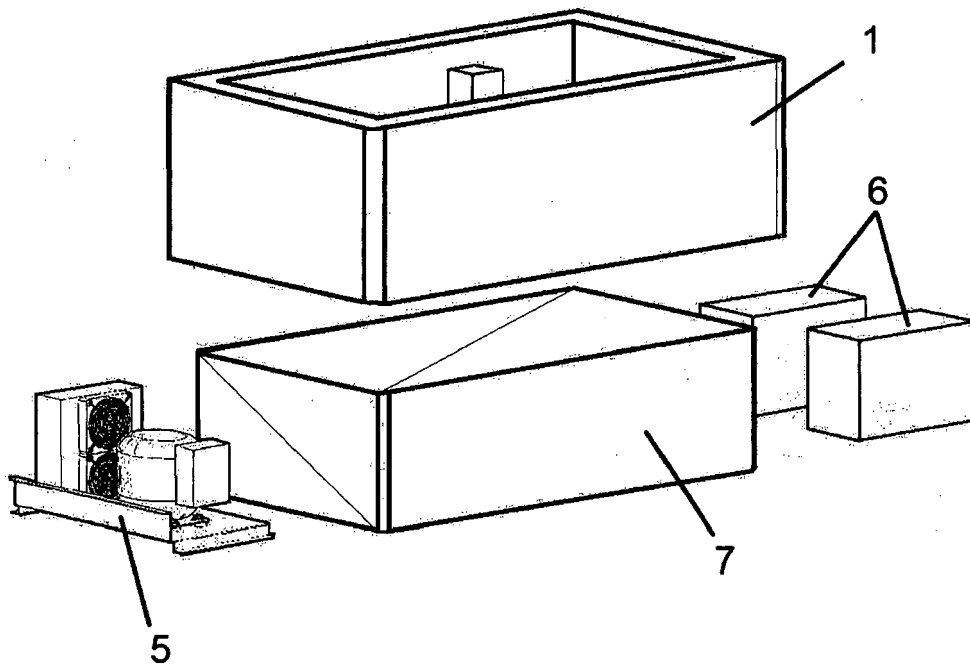


Fig. 4

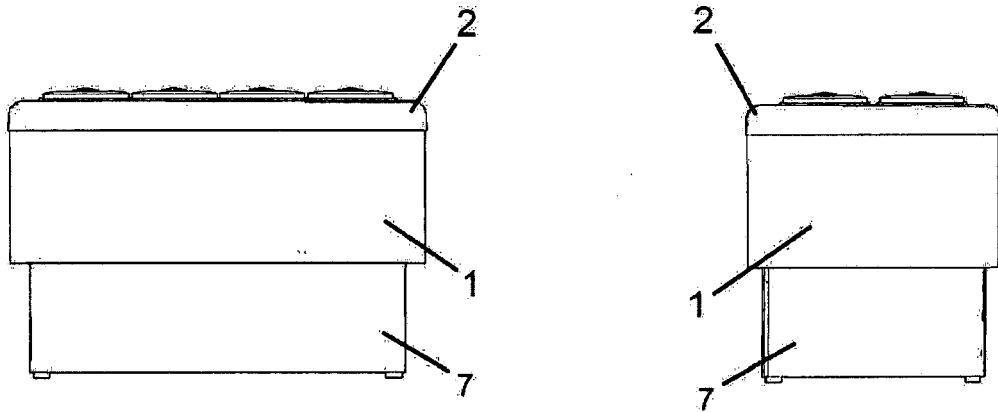


Fig. 5a

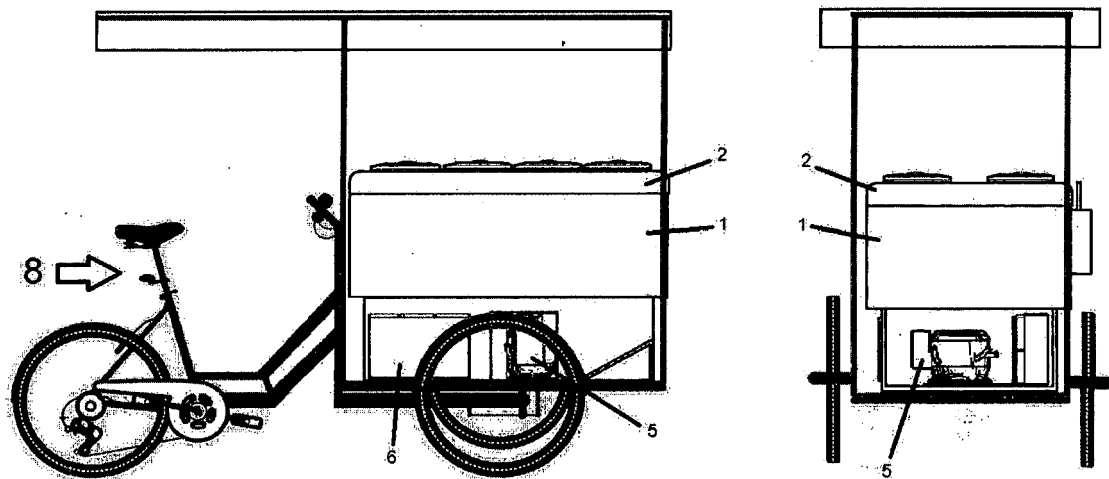


Fig. 5b

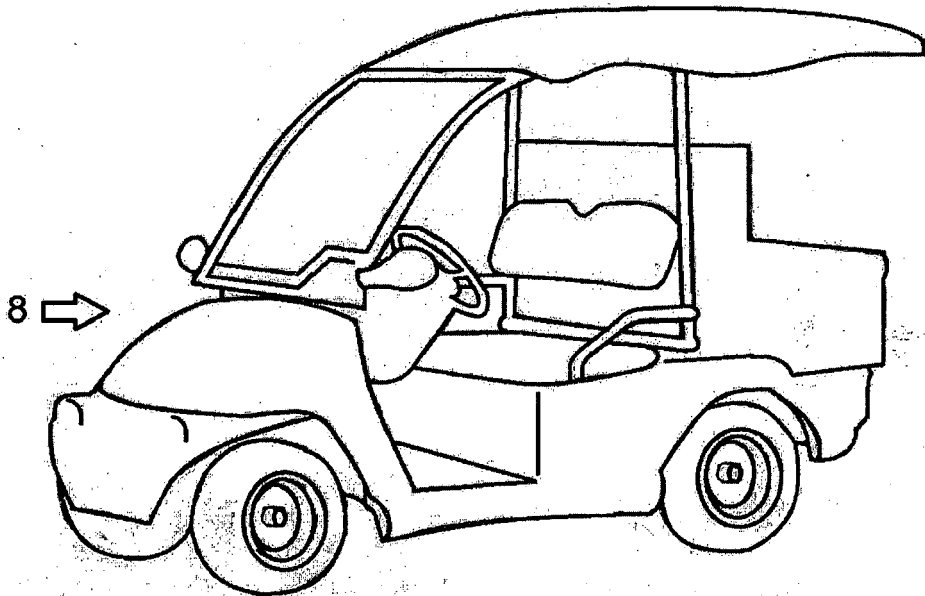
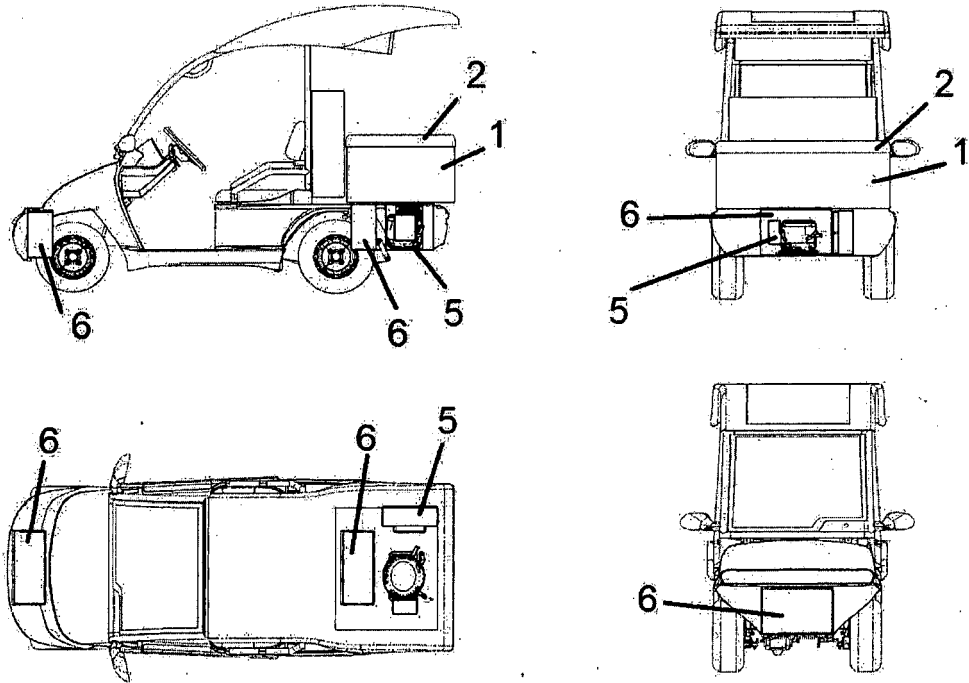


Fig. 5c

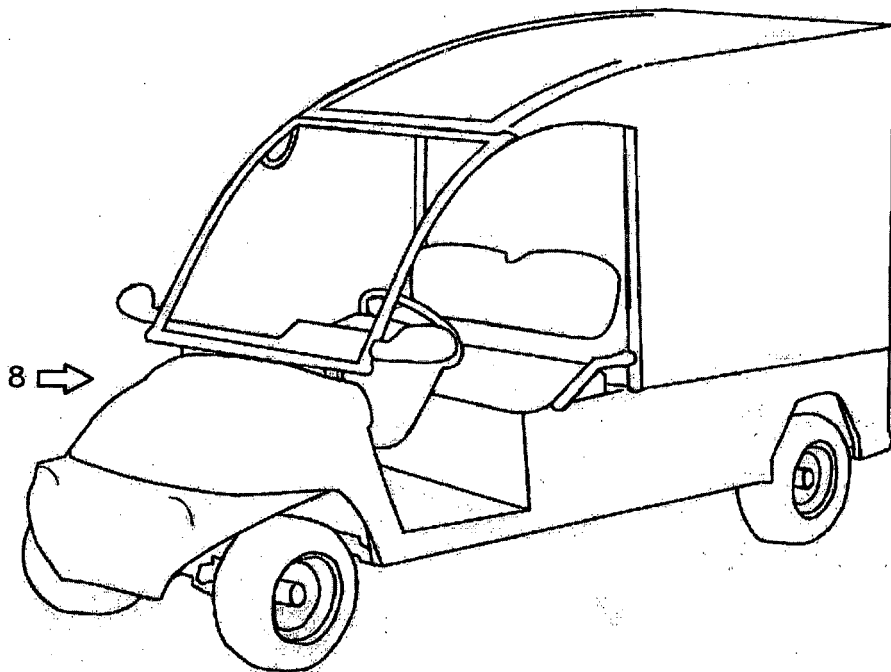
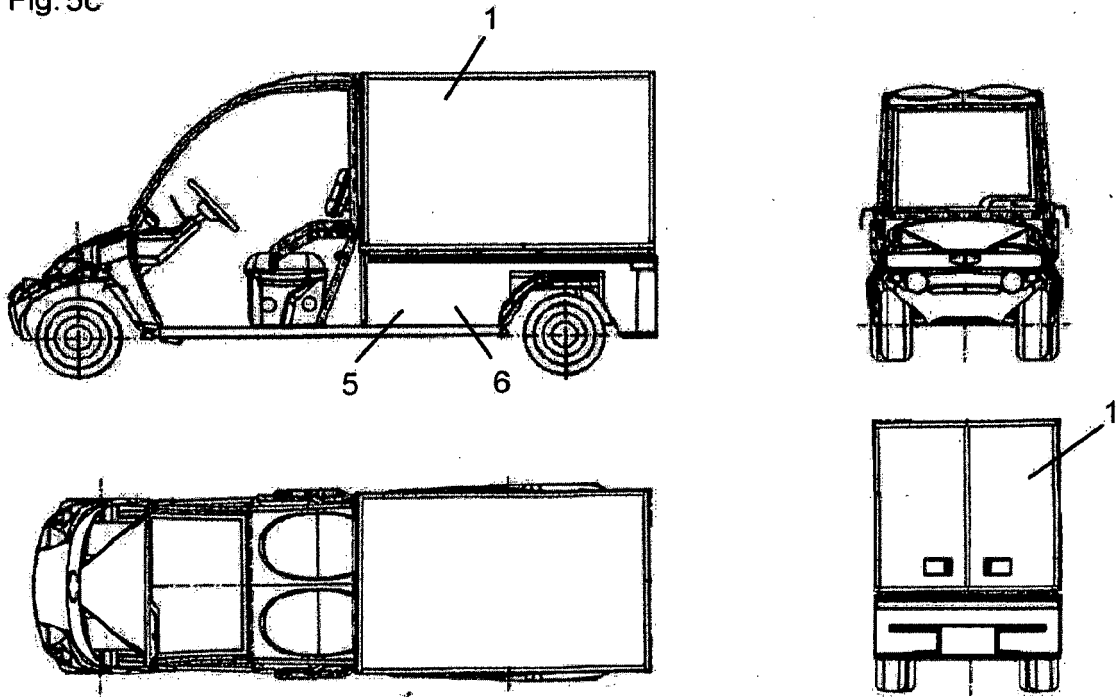


Fig. 6

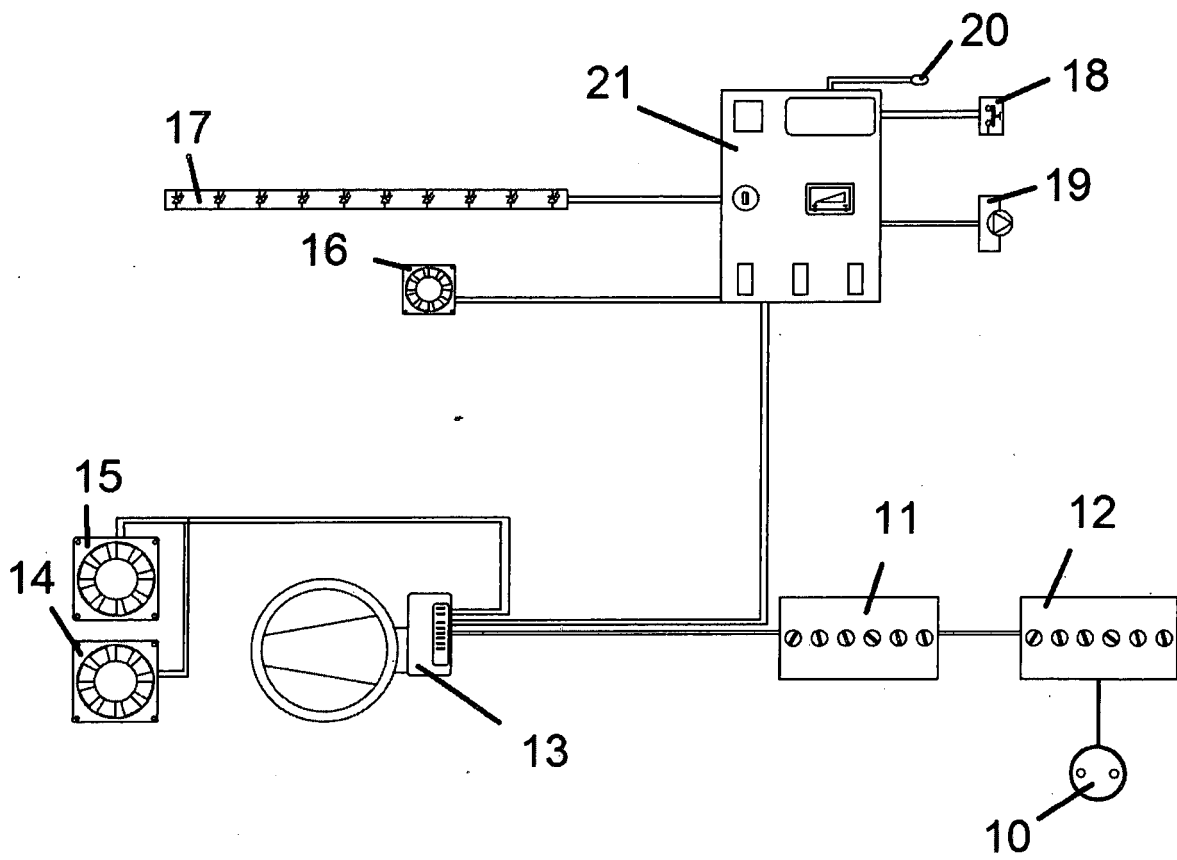


Fig. 7

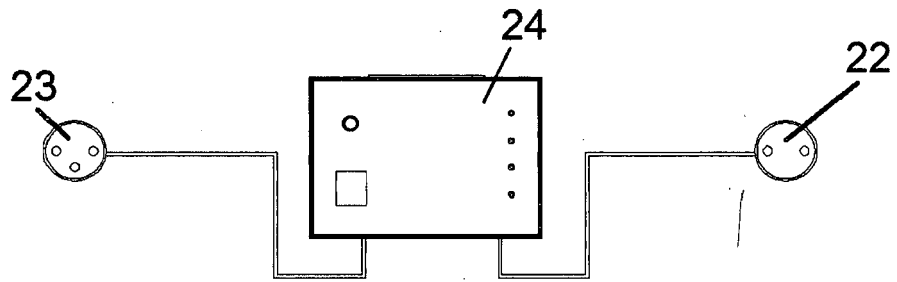
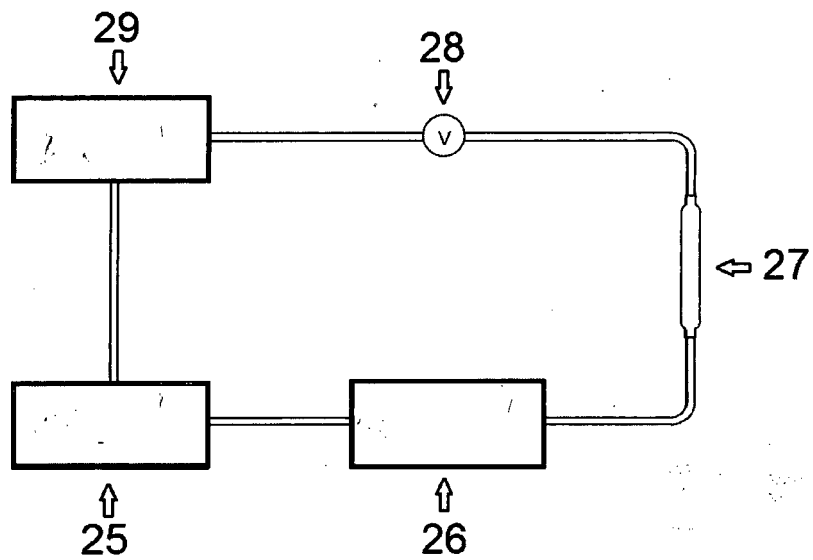


Fig. 8





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Application Number
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Place of search The Hague		Date of completion of the search 22 February 2016	Examiner Melo Sousa, Filipe
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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