An exemplary can heating and cooling device includes a container made of thermally conductive material, a heat spreader with a heat spreading portion and a heat exchanging portion, and a heat exchanger with a thermoelectric cooling chip and a heat sink. The container includes an outer side wall with a planar thermal contacting section of the container. The heat spreading portion of the heat spreader contacts the outer side wall of the container. The heat exchanging portion of the heat spreader contacts the planar thermal contacting section of the container. The thermoelectric cooling chip includes a first surface thermally connected with the heat exchanging portion of the heat spreader, and a second surface thermally connected with the heat sink.
CANN HEATING AND COOLING DEVICE

BACKGROUND

[0001] 1. Technical Field

[0002] The present disclosure generally relates to heating and cooling devices for cans such as food cans.

[0003] 2. Description of Related Art

[0004] As living standards improve, people are turning more and more attention to the convenience and pleasure of purchasing ready-to-eat packaged foods when they are out of the home. Accordingly, canned convenience foods are popular with consumers. Many of such canned foods are bought hot or cold from a store or a vending machine, with the intention that they are consumed immediately. However, in some instances, by the time the consumer is able to begin enjoy the canned food, the original hot or cold can is no longer very hot or cold.

[0005] Therefore, it is desired to provide a device for consumers to heat or cool canned food for enjoyment anytime.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Many aspects of the disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the disclosure.

[0007] FIG. 1 is a schematic view of a can heating and cooling device in accordance with an exemplary embodiment of the present disclosure.

[0008] FIG. 2 is similar to FIG. 1, but showing another aspect of the can heating and cooling device.

[0009] FIG. 3 is an exploded view of the can heating and cooling device of FIG. 2.

[0010] FIG. 4 is similar to FIG. 3, but showing another aspect of the can heating and cooling device.

DETAILED DESCRIPTION

[0011] Reference will now be made to the drawings to describe the present can heating and cooling device in detail.

[0012] Referring to FIG. 1 through FIG. 4, a can heating and cooling device 10 includes a container 11, two heat spreaders 12 and a heat exchanger 13.

[0013] The container 11 is made of thermally conductive material with excellent thermal conductivity, such as ceramic, metal and so on. In this embodiment, the container 11 is made of metal. The container 11 is a hollow cylindrical body for receiving a can of food. The container 11 includes an outer sidewall 112 and an opening 110. The outer sidewall 112 has a planar thermal contacting section 1120. The opening 110 is configured at an upper end of the container 11.

[0014] The heat spreaders 12 surround the container 11 and contact the outer sidewall 112 of the container 11. The heat spreaders 12 are configured for transferring heat to or from the outer sidewall 112, and eliminating temperature differences on the outer sidewall 112. In this embodiment, each heat spreader 12 includes two heat spreading portions 120, and a heat exchanging portion 124 between the two heat spreading portions 120. The two heat spreading portions 120 surround the container 11 and contact the outer sidewall 112 of the container 11. The heat exchanging portion 124 is arranged on and contacts the planar thermal contacting section 1120.

[0015] The heat exchanger 13 includes a thermoelectric cooling chip 130 and a heat sink 132. The thermoelectric cooling chip 130 is capable of performing a heating or cooling function according to different polarities of an external power supply (for example a battery, a power supply on a vehicle, and so on) provided to the thermoelectric cooling chip 130, respectively. The thermoelectric cooling chip 130 includes a first surface 1302 and a second surface 1304. The first surface 1302 thermally contacts the heat exchanging portions 124 of the heat spreaders 12, thereby acting as a heat absorbing surface. The second surface 1304 thermally contacts the heat sink 132, thereby acting as a heat releasing surface to facilitate dissipation of heat.

[0016] When performing a heating function, the thermoelectric cooling chip 130 transfers heat from the second surface 1304 to the first surface 1302. As a result, the heat exchanging portions 124 of the heat spreaders 12 absorb heat from the first surface 1302, and the heat spreading portions 120 spread the heat of the heat exchanging portions 124 to the outer sidewall 112 of the container 11. As such, a can of food received in the container 11 is heated.

[0017] When performing a cooling function, the thermoelectric cooling chip 130 transfers heat from the first surface 1302 to the second surface 1304. As a result, the thermoelectric cooling chip 130 absorbs heat from the heat exchanging portions 124 and transfers the heat to the heat sink 132. Accordingly, the heat exchanging portions 124 are cooled, and the heat spreading portions 120 transfer heat from the outer sidewall 112 to the heat exchanging portions 124. As such, a can of food received in the container 11 is cooled.

[0018] Due to the heat spreaders 12 surrounding the outer sidewall 112 of the container 11, a thermal conductive area between the container 11 and the heat spreaders 12 is increased. Thereby, temperature differences on the outer sidewall 112 are attenuated or eliminated, and excellent temperature uniformity can be achieved.

[0019] In a further embodiment, the planar thermal contacting section 1120 can be configured to include two protrusions 1122 (for example, steps) for supporting and thermally contacting the heat exchangers 13. Each protrusion 1122 extends from the planar thermal contacting section 1120. An elongated recess 1124 is defined between the two protrusions 1122, for receiving the heat exchanging portion 124 of a lower one of the two heat spreaders 12. When assembled together, the heat exchanging portion 124 of an upper one of the two heat spreaders 12 is received on an upper one of the protrusions 1122, with that protrusion 1122 supporting the upper heat exchanging portion 124 and contacting the heat exchanger 13. The lower heat exchanging portion 124 is received in the recess 1124, with a lower one of the protrusions 1122 supporting the lower heat exchanging portion 124 and contacting the heat exchanger 13. Thus, the heat exchanger 13 contacts both of the heat exchanging portions 124 and the protrusions 1122.

[0020] In another further embodiment, the heat exchanger 13 can be configured to include a fan module 134. The fan module 134 includes a fan 1340 and a base 1342. The fan 1340 is located beside the heat sink 132, for cooling the heat sink 132 with forced airflow. The base 1342 is configured for supporting the fan 1340. In addition, the heat exchanger 13 can further include a printed circuit board (PCB) 136, for supporting the thermoelectric cooling chip 130 and circuits of
the fan module 134. Such circuits of the fan module 134 can for example be a power supply circuit, a controlling circuit, etc.

[0021] The can heating and cooling device 10 can further include a shell 14 for receiving the container 11, the heat spreader 12 and the heat exchanger 13. The shell 14 includes a barrel portion 140, a heat dissipating portion 142, and a cap 144.

[0022] The barrel portion 140 includes an upper opening 1400 and has a diameter slightly bigger than that of the container 11. As such, the container 11 and the heat spreader 12 equipped on the outer sidewall 112 can be together received in an interior space of the barrel portion 140, via the opening 1400.

[0023] The heat dissipating portion 142 is configured beside an upper section of the barrel portion 140, and is adjacent to the opening 1400. The heat dissipating portion 142 is configured for receiving the heat exchanger 13. The heat dissipating portion 142 includes an interior space communicating to that of the barrel portion 140. In a still further embodiment, the heat dissipating portion 142 can be provided with a plurality of ventilation holes 1420 therein, thereby enhancing dissipation of heat.

[0024] The cap 144 is generally arch-shaped. The cap 144 is located at the opening 1400 of the barrel portion 140. The cap 144 covers a gap between the outer sidewall 112 of the container 11 and an inner sidewall of the barrel portion 140 of the shell 14. The opening 110 of the container 11 is exposed by a central aperture of the cap 144 to the outer environment. As such, a can of food can be loaded into the container 11 via the opening 110.

[0025] Furthermore, the can heating and cooling device 10 can be equipped with a heat insulation barrel 15. The heat insulation barrel 15 is made of thermally insulating material, and is sandwiched between the container 11 and the shell 14. The container 11 is received in the heat insulation barrel 15, and the heat insulation barrel 15 is received in the barrel portion 140 of the shell 14. Thereby, the container 11 is thermally isolated from the shell 14 by the heat insulation barrel 15.

[0026] In an exemplary embodiment, the heat insulation barrel 15 includes a window 150 configured therein. The window 150 is formed in one side of the heat insulation barrel 15, and extends from a top of the heat insulation barrel 15 to a middle portion of the heat insulation barrel 15. As such, the heat exchanging portions 124 received in the heat insulation barrel 15 are exposed, via the window 150, to the heat exchanger 13 received in the heat dissipating portion 142, and are thereby able to thermally contact the heat exchanger 13.

[0027] It is to be understood that the above-described embodiments are intended to illustrate rather than limit the disclosure. Variations may be made to the embodiments without departing from the spirit of the disclosure as claimed. The above-described embodiments illustrate the scope of the disclosure but do not restrict the scope of the disclosure.

What is claimed is:

1. A can heating and cooling device comprising:
   a container made of thermally conductive material, the container comprising an outer sidewall with a planar thermal contacting section; and
   a heat spreader with a heat spreading portion contacting the outer sidewall of the container and a heat exchanging portion contacting the planar thermal contacting section of the container; and
   a heat exchanger comprising a thermoelectric cooling chip and a heat sink, the thermoelectric cooling chip comprising a first surface thermally connected with the heat exchanging portion of the heat spreader and a second surface thermally connected with the heat sink.

2. The can heating and cooling device according to claim 1, wherein the thermal contacting section has an elongated recess for receiving the heat exchanging portion of the heat spreader.

3. The can heating and cooling device according to claim 2, wherein the first surface of the thermoelectric cooling chip contacts both of the planar thermal contacting section of the container and the heat exchanging portion of the heat spreader.

4. The can heating and cooling device according to claim 1, wherein the heat exchanger further comprises a fan fixed beside the heat sink, the fan being configured for cooling the heat sink by forced airflow.

5. The can heating and cooling device according to claim 1, wherein the heat exchanger further comprises a printed circuit board with a controlling circuit for controlling the thermoelectric cooling chip.

6. The can heating and cooling device according to claim 1, further comprising a shell with a barrel portion having an opening and a heat dissipating portion adjacent to the barrel portion, the barrel portion receiving the container and the heat spreader therein, the heat dissipating portion receiving the heat exchanger therein.

7. The can heating and cooling device according to claim 6, wherein the heat dissipating portion of the shell has a plurality of ventilation holes defined therein.

8. The can heating and cooling device according to claim 6, wherein the shell further comprises a ring-shaped cap located at the opening of the barrel portion and exposing an opening of the container to the outer environment.

9. The can heating and cooling device according to claim 6, further comprising a heat insulation barrel sandwiched between the shell and the container.

10. The can heating and cooling device according to claim 9, wherein a window is defined in one side of the heat insulation barrel, and the heat exchanging portion of the heat spreader extends through the window to thermally connect with the first surface of the thermoelectric cooling chip.

11. A can heating and cooling device comprising:
   a thermally conductive container for receiving a can, the container comprising an outer sidewall with a planar thermal contacting section; and
   a heat spreader with a heat spreading portion contacting the outer sidewall of the container and a heat exchanging portion contacting the planar thermal contacting section of the container; and
   a heat exchanger comprising a thermoelectric cooling chip and a heat sink, with two surfaces of the thermoelectric cooling chip respectively thermally connected with the heat exchanging portion of the heat spreader and the heat sink, the heat exchanger configured for transferring heat from one of the two surfaces to the other surface or transferring heat from the other surface to said one of the two surfaces according to selection by a user, to either heat the heat exchanging portion or cool the heat exchanging portion.
12. The can heating and cooling device according to claim 11, wherein when the heat exchanger heats the heat exchanging portion, the heat exchanger is electrified by an external power source.

13. A can heating and cooling device comprising:
   a thermally conductive container for receiving a can, the container comprising an outer sidewall with a planar thermal contacting section;
   a heat spreader comprising a heat spreading portion contacting the outer sidewall of the container and a heat exchanging portion contacting the planar thermal contacting section of the container; and
   a heat exchanger thermally connected with the heat exchanging portion of the heat spreader, the heat exchanger being configured for transferring heat from the heat exchanging portion to the external environment when the heat exchanger operates in a first mode, and receiving electrical energy from an external power source and transferring heat to the heat exchanging portion when the heat exchanger operates in a second mode.