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CASE FOR COOLING AN ELECTRONIC DEVICE VIA AN ENDOTHERMIC REACTION

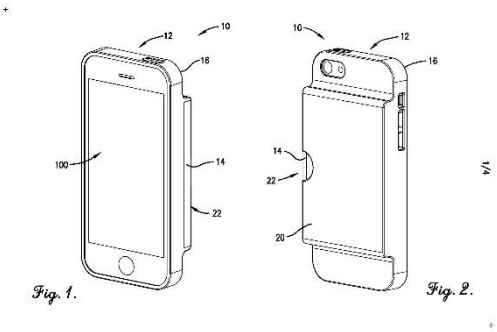
Background

Mobile phones and other portable electronic devices occasionally overheat and fail to operate properly, especially when used in hot environments. Cooling cases with fans, liquid cooling loops, heat sink fins, and/or other cooling mechanisms for drawing heat away from electronic devices have been developed for preventing such overheating. Unfortunately, these cooling mechanisms are often bulky, complicated, and/or expensive and typically require batteries or other sources of electricity. Additionally, heat sinks are ineffective when the ambient temperature is higher than or equal to the temperature of the electronic devices. For example, some portable electronic device holders draw heat away from the electronic devices but do not reduce the temperature near the electronic devices below the ambient temperature.

Description

This technology solves the above-mentioned problems and provides a distinct advance in the art of cooling cases for portable electronic devices. More particularly, the technology provides a case for selectively cooling a portable electronic device via a plurality of separate endothermic reactions between substances retained in the case.

This technology can be utilized in multiple configurations. A general description of the cooling case broadly includes a housing and a cartridge. The housing includes a primary body with a device cavity for retaining the electronic device and a cartridge chamber for retaining the cartridge. The cartridge chamber could extend substantially parallel to the device cavity for optimizing the cooling effects of the endothermic reaction.



The cartridge retains two or more substances for creating an endothermic reaction and may include a first set of compartments, a second set of compartments, and a partition. In this arrangement, the compartments are paired so as to separately hold first and second substances. The partition separates all of the compartments and could include a selectively breachable divider extending between paired compartments allowing for flexibility in the magnitude and timing of the endothermic reactions.

For example, a user may press his finger or a tool against a desired divider until it is breached. The first and second substances in the corresponding pair of compartments would then mix or combine so as to generate an endothermic reaction. The endothermic reaction will create a thermal gradient between the case and the electronic device such that heat is transferred or drawn from the electronic device to the case, thereby cooling the electronic device. The duration and magnitude of the endothermic reaction, and hence the cooling effect, is determined by the quantity of the first and second substances in the corresponding compartments and indirectly to the size of the corresponding compartments. As such, if continuing to cool the electronic device is required as the endothermic reaction nears or reaches completion, another divider corresponding to additional compartments may be selectively breached. Similarly, if the electronic device needs increased cooling, multiple dividers of the partition may be selectively breached simultaneously. If each pair of compartments is a different size, the duration and magnitude of the endothermic reaction and the resulting cooling effect may be selected by puncturing larger or smaller pairs of compartments. Thus, the duration and magnitude of the cooling effect may be selectively controlled.

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When all of the substances have undergone an endothermic reaction, the cartridge can be removed from the cartridge chamber of the housing and a new cartridge can be inserted into the cartridge chamber for further cooling of the electronic device.

The device could also include a breaching mechanism for breaching the partition dividers of the cartridge in response to an electronic signal. The breaching mechanism includes a set of pins, cutting edges, or other similar members configured to be selectively actuated towards the dividers until the dividers are torn, repositioned, punctured, or otherwise compromised.

The breaching mechanism could be activated by an electronic signal received via a transceiver, external electronic connection, or integrated input such as a push-button positioned on the housing. For example the breaching mechanism may initiate an endothermic reaction upon receiving a signal from the electronic device that its internal temperature is too high. Alternatively, the signal may originate from a temperature sensor in the housing of the case.

Advantages

This cooling case provides numerous advantages. For example, by employing a cooling device that reduces heat via an endothermic reaction, the cooling case may cool a mobile phone or other electronic device without draining the device's battery or requiring an additional battery. The cooling device may also be replaced repeatedly for extended use of the electronic device. Additionally, by providing a removable cooling device that is sub-divided into a number of separate compartments, a selected amount of heat reduction may be provided and/or heat reduction may be provided at selected time intervals.

Applications

This invention has applications for all mobile electronics that fail to operate in hot temperature conditions including:

- Mobile phones
- Tablets
- Cameras
- Two way radios
- Global Positioning Systems (GPS)
- Laptop computers
- Power tools

Intellectual Property Status

This technology is protected under US Patent # 9,608,686.

Keyword List

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