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Patentability of Tamper-Resistant Temperature Controlled Food Storage Device for Hikers

**Summary of Invention**

Food is an essential element in every hiking trip. When it comes to packing food for hiking, hikers are usually concerned about two important factors. The first is protecting their food from bears and other wildlife. The second is the safety of their perishable food supply. According to REI.com Expert Advice editor, T.D. Wood, resourceful black bears, driven by a powerful sense of smell (one hundred times stronger than a dog's) have become some of the most determined creatures on earth when it comes to snatching food from humans. Thus, increasingly drastic measures are needed to protect the hiker's food.

Over the past few decades, the solution of choice to this problem has been the use of tamper-resistant food containers. Though these containers are very effective at keeping food out of the reach of bears and other wildlife, they are inadequate when it comes to storing perishable foods, and as such, hikers are forced to pack dry, non perishable foods such as granola bars and beef jerky to provide sustenance for trips that could sometimes last weeks. This problem can be solved by the use of a temperature-regulated, tamper-resistant food storage device that protects from bears and other wildlife, and also allows hikers to pack non-dry perishable foods, and other fresh produce.

The invention proposed is a tamper-resistant container with an insulated thermoelectric refrigeration unit comprising of a thermoelectric device, forced-air convection fans, a temperature control unit, and a rechargeable battery pack.

**Component Analysis**

The device consists of a rugged, tamper resistant container made out of tough ABS plastic for protection against bears and other wildlife. Within this container is an inner cavity with insulated walls to minimize heat loss between the cavity and the ambient environment.

Underneath this cavity is a thermoelectric refrigeration unit consisting of forced air convection fans and thermoelectric modules to provide cooling of foods at desired temperatures. A rechargeable NiMH battery pack is coupled with the thermoelectric module to provide power for the active thermoelectric module.

The battery pack consists of two removable arrays of NiMH batteries, each coupled with a strip of flexible photovoltaic cells. During the day, one the arrays can be removed, and attached to the top of a hiking bag for recharging, while the other array powers the thermoelectric refrigeration unit.
Within the inner cavity is a temperature sensor and temperature control unit that ensures that the food inside the cavity is maintained at the desired temperature.

**Relevant Prior Art**

The invention is an improvement of a rugged, tamper-resistant food storage device for hikers and campers, and uses a combination of inventions from the design of tamper-resistant containers , and portable thermoelectric refrigeration units to achieve the desired outcome. The most influential of these prior arts are highlighted in bold, and will be presented in the appendix section.

1. **Garcia Bear-Resistant Container**:
    - Industry standard tamper resistant food storage device. Comprised of a tough ABS polymer, with smooth sides that prevents bears from gripping the canister. It features a stainless steel lock that makes it easy for humans to open with a coin, but difficult for bears to pry open. http://www.rei.com/product/624081
2. Bear Vault Bear Canister:
    - Tamper-resistant food storage device comprising a transparent polycarbonate housing and a patent pending design that allows opening and closing the canister without tools. http:// www.bearvault.com
3. **U.S Patent App 20070045319a1**:
    - Features a light weight, low cost, tamper-resistant container with climatic tolerance, which presents a virtually impenetrable barrier to animals.
4. U.S Patent 2057036:
    - Portable refrigerator suitable especially for use in camping and picnicking , and of such size that it may readily be carried in the rear compartment of an automobile.
5. U.S Patent 4444324:
    - Compartmented storage container for storing liquids or foods, having an insulated wall
6. U.S Patent 5301508:
    - **Thermoelectric Portable Container that** selectively heats and cools interior of container. Comes with a power cord for plugging into a power outlet or a car inverter unit.
7. U.S Patent 5247798:
    - Portable Refrigerator cabinet for effectively cooling beverage containers using a thermoelectric cooling unit. It has spaced inner and outer walls formed of plastic, and in-between the walls is filled with foam plastic to provide insulation.
8. U.S Patent 6003713:
    - Cooling container that includes radiant heat barrier. Used for keeping beverages, food, medical supplies, drugs and other heat sensitive products at lower than ambient temperatures. Active cooling is not involved in this process, rather the food must be at the desired temperature when stored, and the container acts as an insulator between the food and the ambient environment.
9. U.S Patent 3800554:
    - Food Storage and Cooling Apparatus for keeping frozen and refrigerated food. Consists of a housing cavity with thermal insulation material, and uses a predetermined quantity of solidified carbon dioxide as the cooling fluid.
10. U.S Patent 3315474:
    - Mobile Thermoelectric Refrigeration System adapted for installation and operation in a motor vehicle
11. U.S Patent 4738113:

- Combination cooler and freezer for refrigerating containers and food in outer space. Consists of a container cold plate with compliant heat transfer medium (metal-filled silicone rubber), and a thermoelectric generator with freezer compartment for cooling. refrigeration apparatus for cooling containers and food in microgravity conditions of

12. U.S Patent 5771788:
    - Food Storage device employing a thermoelectric element as a heat source and sink for food storage. Consists of a heat exchanger and pump for either : a) heating the fluid in a fermenting mode of the food storage device, or b) cooling the fluid in a refrigerating mode of the food storage device
13. U.S Patent 6976371:
    - Portable food cooling container: portable refrigeration apparatus includes a base defining an open interior cavity
14. U.S Patent 6658858:
    - Food Chiller with enclosing air duct system, utilizing a Peltier effect thermoelectric device for chilling fresh fruit and other fresh food products.
15. **U.S Patent 5111664**:
    - Portable refrigerating/ heating apparatus for cooling or heating drinks and foodstuff. Consists of a food preserving portion and a heat exchanging portion based on the application of a Peliter element (thermoelectric device).
16. U.S Patent 6301901:
    - Thermoelectric cooler and warmer for food with table top tray, which can be selectively used as a cooler or warmer for food and beverages.
17. U.S Patent 4326383:
    - Compact Thermoelectric refrigerator consisting of a thermoelectric module with low profile, high density external heat exchanger and forced air convection fans.
18. **U.S Patent 4107934:**
    - Portable Refrigerator Unit: Portable refrigerator unit cooled by thermoelectric element of the Peltier type, having hot and cold faces adapted to be energized by an external DC source, which can be disconnected from the unit to make the unit entirely portable.

**Patentability Analysis**

For this invention to be considered patentable, it must meet the three main statutory requirements of utility, novelty, and non-obviousness as prescribed by 35 U.S.C. 101, 35 U.S.C 102, and 35 U.S.C 103 respectively.

The first requirement, utility, requires that an invention be useful and of patentable subject matter (machine, article, process or composition). The subject of the invention, a tamper-resistant, temperature regulated food storage device is patentable subject matter as it falls under the statutory class of machine. The use of this machine is to provide a temperature regulated environment for storing temperature sensitive food, and to prevent wildlife such as bears from tampering with the contents of the device. The utility of this device lies in the fact that it is an improvement upon the historical commercial success of other tamper-resistant food storage devices for hikers, and also the fact that several prominent National Parks make the use of tamper-resistant food storage devices mandatory.

The novelty requirement is prescribed under 35 U.S.C 102 as follows:
"A person shall be entitled to a patent unless… the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country before the invention thereof by the applicant… "(35 U.S.C. 102a)

> (1) "A person shall be entitled to a patent unless… the invention was described in (1) an application for patent by another field in the United States before the invention by the application, or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent…" (35 U.S.C 102e)

This requires a comparison of the invention and its relative components with the prior arts. The factors to consider are: whether the new invention has any new physical features compared to the prior art, whether it is a new combination or arrangement of old features, or whether it is the new use of an old feature.

A tamper-resistant, temperature regulated food storage device does not only embody the features of a typical tamper-resistant food storage device such as bear canisters, but also embodies the use of a thermoelectric refrigeration module, a battery pack, and a temperature control unit. Similarly, the invention does not only embody the features of a portable thermoelectric refrigerator, but also the use of a tamper-resistant outer casing for protection against bears and other wildlife. Thus, it has new physical features compared to the prior art, as it combines old features from tamper-resistant containers, and portable thermoelectric refrigerators. Since the prior art search did not yield an invention with all the elements of the subject invention, the invention is novel, on the grounds that it is a new combination of old features . great.

The third main statutory requirement, non-obviousness, under 35 U.S.C 103 stipulates that:
"a patent may not be obtained… if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."
In order to clearly determine if the invention meets this statutory requirement, it is important that we examine an example of the statue's implementation. An appropriate implementation of this statute can be found in the KSR Supreme Court case.

One pertinent holding of the case is: "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results… When a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result" . The invention, a tamper-resistant, temperature regulated food storage device, is a combination of elements from the prior art in which the combination is not expressly suggested or implied by the prior art. Patent application **20070045319a1** describes a lightweight, low cost, tamper resistant container with climatic tolerance, which presents a virtually impenetrable barrier to animals, whereas **Patent 5111664** describes a portable refrigerating apparatus for cooling drinks and foodstuff using a thermoelectric device. **Patent 4107934** further talks about a portable thermoelectric refrigerator unit which uses an external DC source that can be disconnected making the unit entirely portable. The subject of the invention combines the features of a tamper-resistant container with climatic tolerance as described in Patent application 20070045319a1, with features from both the thermoelectric refrigeration unit described in Patent 5111664, and portable thermoelectric unit that utilizes a DC source in Patent 4107934. Concerning the invention, the tamper-resistant container is similar in design to Patent 5111664. However, the invention also features a temperature control unit, and rechargeable NiMH

battery pack with solar cells for recharging the unit. These features are not present in Patent application 20070045319a1 and Patent 5111664.

The fact that the invention is a combination of familiar elements according to known methods, and only incorporates two new features, makes it arguable whether the invention does more than yield predictable results. Outdoor equipment manufacturing companies like Coleman have been manufacturing thermoelectric coolers and tamper-resistant containers for more than a decade. Yet, a search of the prior art did not yield an invention that combines elements of these two products. As such, the combination is not expressly suggested or implied by the prior art, and is unobvious.

Importantly, the subject matter as a whole was not obvious at the time of the invention to a person having ordinary skill in the art (Coleman & other hiking gear manufacturers) to which the subject invention pertains. Furthermore, the invention is more than the predictable use of prior art elements according to their established functions. It is a synergy in which the results are greater than the sum of the results of the references.

**Patentability Summary**

The invention satisfies the three main requirements for patentability: usefulness, novelty, and non-obviousness. The temper-resistant, temperature controlled food storage device is useful for storing temperature sensitive foodstuff, and prevent tampering of the food contents by bears and other wildlife during hiking or camping. The invention also meets the novelty and the non-obviousness requirement, where prior art search showed that camping gear manufacturers and other experts in the field, with decades of experience in manufacturing thermoelectric coolers and bear canisters, have not come up with an invention that combines elements of these two products. Since the current invention meets all three statutory requirements for patentability, it is patentable.

Appendix I: References:


1. Schox, Jeffrey. "Patent Law and Strategy for Inventors and Entrepreneurs" Course Text. Schox PLC. 2006-2009
2. Federal Register. "USPTO Guidelines for Determining Obviousness". Vol. 72, No. 195. Wednesday, October 10, 2007
3. Pressman, David . Patent It Yourself: Your Step-by-Step Guide to Filing at the US Patent Office. Berkeley: Nolo, 2009.
4. Wood, T.D.. "Reasons for Using Bear-Resistant Canisters: Expert Advice from REI." REI: Deals on Outdoor Gear, Equipment and Clothing for Camping, Cycling, Fitness, Hiking, Kayaking and More. 30 Oct. 2009 <http://www.rei.com/expertadvice/articles/bear+resistant+canisters.html>


Appendix II: Links to Most Relevant Prior Art:

1. Tamper-resistant container and methods. Application # **20070045319a1** Inventor: Jamie Hogan. http://www.google.com/patents?id=upiaAAAAEBAJ&zoom=4&pg=PA8#v=onepage&q=&f=false
2. Portable refrigerating/ heating apparatus. Patent # 5111664 Inventor: Kun M. Yang

http://www.google.com/patents?id=bC0cAAAAEBAJ&zoom=4&pg=PA1#v=onepage&q=&f=false

3. Portable refrigerator unit. Patent # 4107934
   Inventor: Shlomo Beitner
   http://www.google.com/patents?id=dSw0AAAAEBAJ&zoom=4&pg=PA1#v=onepage&q=&f=false

NOTES: Great invention capture, search strategy, and search results. The novelty analysis was perfect, but the obviousness analysis appears lacking. Why wouldn't it be obvious to combine all of these features into one package? Do the references provide proper motivation to do so? What elements would be necessary in the invention, but were not found in the prior art?

GRADE: A- (7/9 points)