Provisional Patent Application for a Device which Provides a Tamper-Resistant, Temperature-Regulated Environment for Storing Perishable Products

BRIEF DESCRIPTION OF THE FIGURES

[0001] FIGURE 1 is a split isometric view of the device of the first preferred embodiment.

[0002] FIGURE 2 is an isometric view of the top component of the device of the first preferred embodiment.

[0003] FIGURE 3 is a front view of the device of the first preferred embodiment.

[0004] FIGURE 4 is a split isometric view of the device of the second preferred embodiment.

[0005] FIGURE 5 is a front view of the top component of the device of the second preferred embodiment.

[0006] FIGURE 6 is a front view of the device of the second preferred embodiment.

[0007] FIGURE 7 is a flow chart explaining how the device provides a temperature regulated environment for storing perishable products.

[0008] FIGURE 8 is a representation of one of the many suitable ways the device of both the first and second preferred embodiment could be used.

[0009] FIGURE 9 is yet another representation of one of the many suitable ways the device of both the first and second preferred embodiment could be used.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010] The following description of the preferred embodiments of the invention is not intended to limit the invention to these preferred embodiments, but rather to enable any person skilled in the art to make and use this invention.

1. First Preferred Embodiment

[0011] As shown in FIGURES 1,2 and 3, the device of the preferred embodiment functions to provide a tamper-resistant, temperature regulated environment for storing perishable products. The device of the first preferred embodiment includes:

(a) a tamper-resistant container **8**; (b) a cooling unit **12**; (c) a microcontroller and power supply unit **14**; (d) a storage cavity **34**; (e)sensors to measure or estimate the temperature of the storage cavity of the device **16R, 16L**;(f) a mechanism that minimizes heat loss **18R,18L**; (g) carrying straps **4**; (h) an attachment mechanism **2** to provide an alternative transportation of the device; (i) a secure seal mechanism by means of buttress threads **6**; (j) a power switch **10**.

are all of these elements required? what if there was one messenger-bag style strap (and not strapS)?

[0012] The device of the first preferred embodiment may be used during hiking trips where hikers may have access to tamper-resistant food containers, but no means of preserving their perishable food. In this environment, the primary objective is to both protect food from being tampered with by wild animals, and also to provide a suitable environment to store and preserve perishable food.

[0013] The device of the first preferred embodiment may also be used to transport temperature-sensitive medical products in areas that are difficult to access, such as disaster zones, desert regions, mountainous regions, and other regions that lack the

minimum infrastructure required (e.g. roads) to easily transport these temperature-sensitive medical products.

[0014] The tamper-resistant container of the first preferred embodiment (**8**) functions to provide a protective barrier between the products contained in the storage cavity of the device (**34**) and the external environment in which the device will be used. The tamper-resistant container is preferably made out of high-strength ABS plastic, but may use any suitable material, device, or method that allows the container to withstand violent impacts and harsh external conditions.

[0015] The cooling unit of the first preferred embodiment (**12**) functions to maintain the stored perishable products at an optimum temperature. The cooling unit preferably provides the desired amount of cooling with minimum energy requirements. The cooling unit is preferably a synthetic-jet cooling unit, but may use any suitable device or method, including a thermoelectric cooling unit.

not enough enablement

[0016] The micro-controller and power supply unit of the first preferred embodiment (**14**) function to provide sufficient power for all the electronic components of the device, and do so in such a manner that the device provides efficient cooling with minimal use of energy. The power supply unit preferably comprises of an energy storage device such as a battery pack and a regulator circuit, but may include any suitable device or method, such as photovoltaic cells. The microcontroller unit is preferably a standardized programmable chip such as a Field Programmable Gated Array (FPGA), which can be programmed to perform the functions indicated. Specifically, the microcontroller unit, when triggered by the switch (**10**) will take input from the sensors (**16R, 16L**) in the storage cavity of the device (**34**) and determine when to supply power to the cooling unit in

order to maintain the optimum temperature in the storage cavity, as illustrated in Fig. 7. The microcontroller unit may, however, include any suitable method for regulating such an environment given similar temperature and power constraints.

[0017] The storage cavity of the first preferred embodiment (**34**) functions to provide a protected, temperature-regulated storage system for perishable products. The storage cavity is preferably constructed out of non-corrosive material with high insulation capacity. The storage cavity may however include any suitable device or method to provide a protected temperature-regulated storage system in a suitable environment.

[0018] The sensors of the first preferred embodiment (**16R/ 16L**) function to provide a measurement or estimate of the temperature of the storage cavity of the device. In a first variation, the sensors directly measure the ambient air temperature of the storage cavity. The sensors may include thermocouples, resistance thermometer detectors or any other suitable detectors to measure the ambient air temperature of the cavity. In a second variation, the sensors measure the surface temperature of the walls of the storage cavity. The sensors may include thermocouples or other suitable detectors to measure the surface temperature of the walls of the storage cavity.

[0019] The mechanism that minimizes heat loss of the first preferred embodiment (**18R/18L**) functions to minimize heat loss between the storage cavity (**34**) and the ambient environment. This mechanism is preferably a vacuum separating the storage cavity from the exterior of the device, but may include any suitable mechanism or method that minimizes heat loss, such as the use of insulation material.

[0020] The carrying straps of the first preferred embodiment (**4**) function to facilitate a convenient means of transporting the device. The carrying straps are preferably

made with standard nylon straps used in camping gear, but may include any suitable device or method that facilitates a convenient means of transporting the device.

[0021] The attachment mechanism of the first preferred embodiment (**2**) functions to provide an alternative means for transporting the device. The attachment mechanism is preferably a carabineer clip that allows the device to be easily attached to the clothing of the user, or to be attached to other equipment carried by the user, and thus hang from the body or equipment of the user. The attachment mechanism may however include any suitable method that allows the device to be easily transported.

[0022] The secure seal mechanism of the first preferred embodiment (**6**) functions to secure the products stored in the storage cavity of the device, to prevent unwanted tampering of the contents stored in the device, and to seal the scents of the contents stored in the device so that animals are not attracted to the contents or their scents. The secure seal mechanism is preferably a buttress thread joint between the top cover of the device and the bottom portion of the device that holds the stored products. The secure seal mechanism may, however, include any suitable mechanism or method to secure the products stored in the storage cavity of the device.

[0023] The power switch of the first preferred embodiment (**10**) functions to activate the temperature regulated system of the device. The power switch is preferably a standard push-button switch, but may include any suitable device or method for activating an electronic system.

2. Second Preferred Embodiment

[0024] As shown in FIGURES 4, 5, and 6, the device of the preferred embodiment functions to provide a tamper-resistant, temperature regulated environment for storing perishable products. The device of the second preferred embodiment includes:

(a) a tamper-resistant container **8**; (b) a cooling unit **20R, 20L**; (c) a microcontroller and power supply unit **26**; (d) a storage cavity **34**; (e)sensors to measure or estimate the temperature of the storage cavity of the device **30R, 30L**;(f) a mechanism that minimizes heat loss **32R,32L**; (g) carrying straps **4**; (h) an attachment mechanism **2** to facilitate a convenient transportation of the device; (i) a secure seal mechanism by means of a press fit **22**; and (j) a power switch **24**.

[0025] The device of the second preferred embodiment may be used during hiking trips where hikers may have access to tamper-resistant food containers, but no means of storing their perishable foods. In this environment, the primary objective is to both protect food from being tampered with by wild animals, and also to provide a suitable environment to store perishable foods.

[0026] The device of the second preferred embodiment may also be used to transport temperature-sensitive medical products in areas that are difficult to access, such as disaster zones, desert regions, mountainous regions, and other regions that lack the minimum infrastructure required (e.g. roads) to easily transport these temperature-sensitive medical products.

[0027] The tamper-resistant container of the second preferred embodiment (**8**) functions to provide a protective barrier between the products contained in the storage cavity of the device (**34**) and the external environment in which the device will be used. The tamper-resistant container is preferably made out of high-strength ABS plastic, but may use any suitable material, device, or method that allows the container to withstand violent impacts and harsh external conditions.

[0028] The cooling unit of the second preferred embodiment (**20L,20R**) functions to maintain the stored perishable products at an optimum temperature. Compared to the first preferred embodiment, the cooling unit of the second preferred embodiment places the cooling unit in the vacuum between the storage cavity and the exterior of the device, to both maximize the cooling of the products in the storage cavity and minimize heat loss to the external environment. The cooling unit preferably provides the desired amount of cooling with minimum energy requirements. The cooling unit is preferably a synthetic jet cooling unit, or a high-efficient fan with minimal heat generation, but may use any suitable device or method, including a thermoelectric cooling unit.

[0029] The micro-controller and power supply unit of the second preferred embodiment (**26**) function to provide sufficient power for all the electronic components of the device, and to do so in such a manner that the device provides efficient cooling with minimal use of energy. The power supply unit preferably comprises of an energy storage device such as a battery pack, and a regulator circuit, but may include any suitable device or method such as photovoltaic cells. The microcontroller unit is preferably a standardized programmable chip such as a Field Programmable Gated Array (FPGA) which can be

programmed to perform the functions indicated. Specifically, the microcontroller unit, when triggered by the switch (**24**) will take input from the sensors (**30R, 30L**) in the storage cavity of the device (**34**) and determine when to supply power to the cooling unit (**20L, 20R**) in order to maintain the optimum cavity temperature as illustrated in Fig. 7. The microcontroller unit may however include any suitable method for regulating such an environment given similar temperature and power constraints.

[0030] The storage cavity of the second preferred embodiment (**34**) functions to provide a protected, temperature-regulated storage system for perishable products. The storage cavity is preferably constructed out of non-corrosive material with high insulation capacity. The storage cavity may however include any suitable device or method to provide a protected temperature-regulated storage system in a suitable environment.

[0031] The sensors of the second preferred embodiment (**30R,30L**) function to provide a measurement or estimate of the temperature of the storage cavity of the device. In a first variation, the sensors directly measure the ambient air temperature of the storage cavity. The sensors may include thermocouples, resistance thermometer detectors or any other suitable detectors to measure the ambient air temperature of the cavity. In a second variation, the sensors measure the surface temperature of the walls of the storage cavity. The sensors may use thermocouples, or other suitable detectors to measure the surface temperature of the walls of the storage cavity.

[0032] The heat loss minimizing mechanism of the second preferred embodiment (**32R,32L**) function to minimize heat loss between the storage cavity (**34**) and the ambient environment. This mechanism is preferably a vacuum, separating the storage cavity from

the exterior of the device, but may use any suitable method that minimizes heat loss between the storage cavity and the ambient environment.

[0033] The carrying straps of the second preferred embodiment (**4**) function to facilitate a convenient means of transporting the device. The carrying straps are preferably made with standard nylon straps used in camping gear, but may use any suitable device or method that facilitates a convenient means of transporting the device.

[0034] The attachment mechanism of the second preferred embodiment (**2**) functions to provide an alternative means for transporting the device. The attachment mechanism is preferably a carabineer clip that allows the device to be easily attached to the clothing of the user, or to be attached to other equipments carried by the user, and thus hang from the body or equipment of the user. The attachment mechanism may however include any suitable mechanism or method that allows the device to be easily transported.

[0035] The secure seal mechanism of the second preferred embodiment (**22**) functions to secure the products stored in the storage cavity of the device, to prevent unwanted tampering of the contents stored in the device, and to seal the scents of the contents stored in the device so that animals are not attracted to the contents or its scents. The secure seal mechanism is preferably a press fit mechanism between the top portion of the device and the bottom portion of the device that holds the stored products. The secure seal mechanism may, however, include any suitable mechanism or method to secure the products stored in the storage cavity of the device.

[0036] The power switch of the second preferred embodiment (**24**) functions to activate the temperature regulated system of the device. The power switch is preferably a

standard push-button switch, but may however include any suitable device or method for activating an electronic system.

[0037] As a person skilled in the art will recognize from the previous detailed description and from the figures and claims, modifications and changes can be made to the preferred embodiments of the invention without departing from the scope of this invention defined in the following claims.

good drawings. good description of the invention at a low level abstraction. good organization. not clear the difference between the two embodiments. the similarities outweighed the differences (which were not adequately highlighted). thought the high level abstraction was too narrow. the provisional application would have benefited from more enablement of the various elements.

GRADE: B+ (6/9 points)

CLAIMS

We Claim:

1. The inventions as shown and/or described.

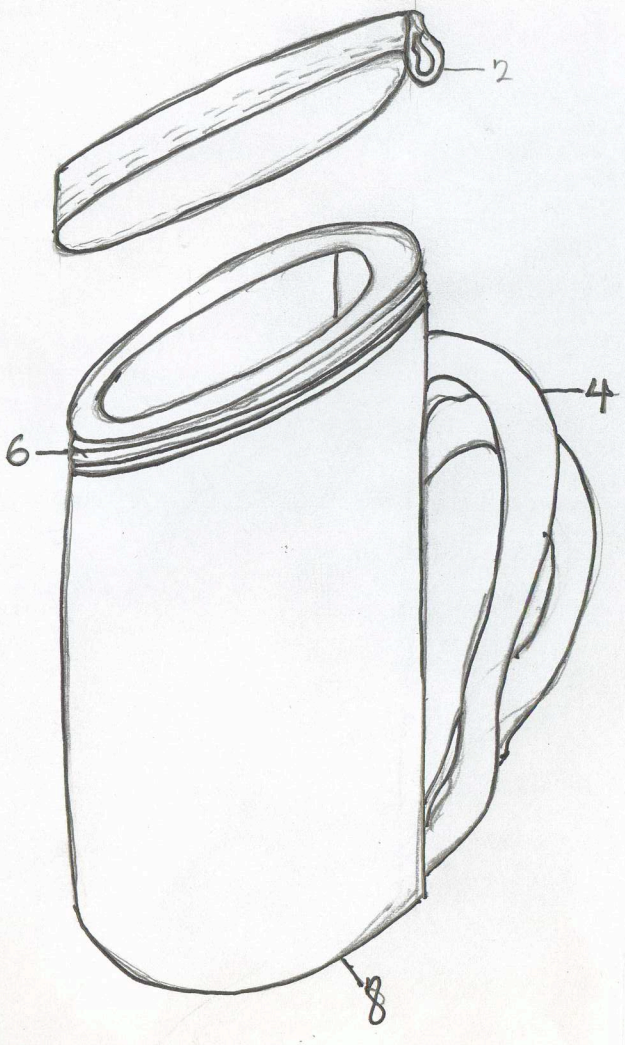
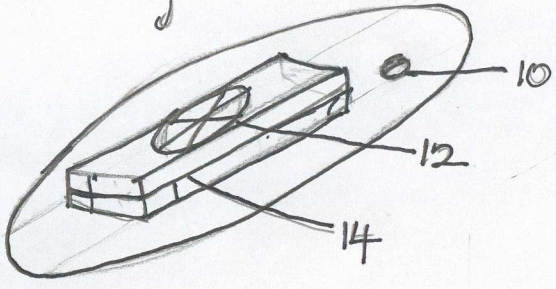


Fig. 1

Fig. 2



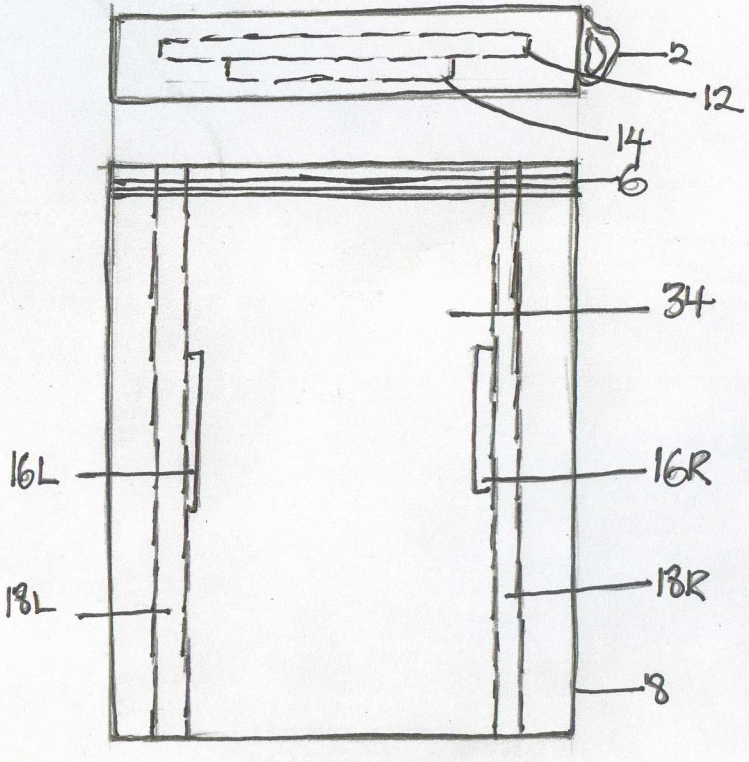


Fig. 3

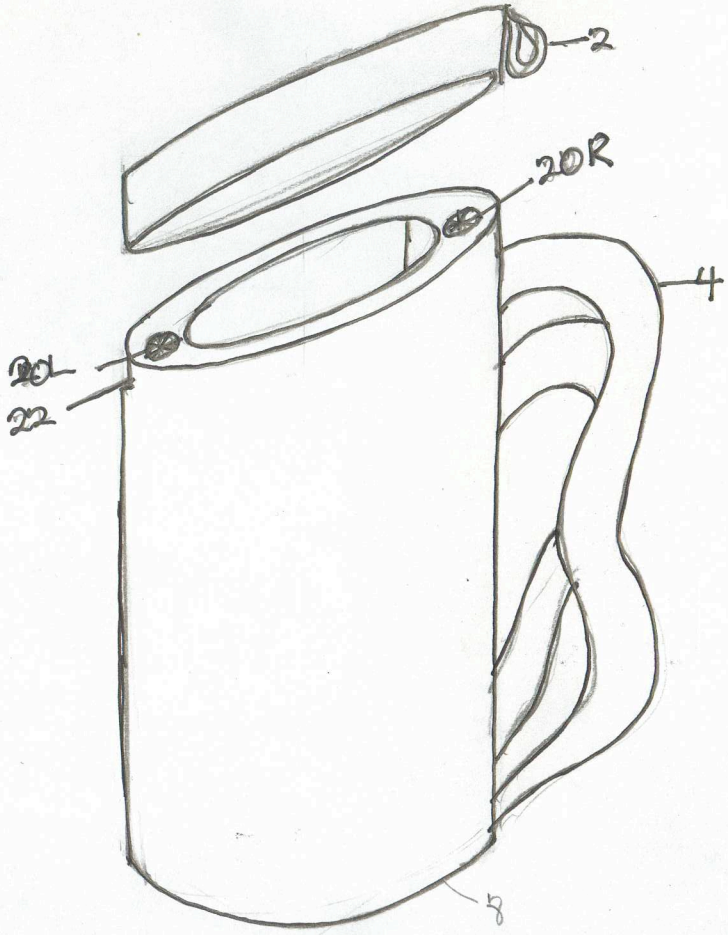
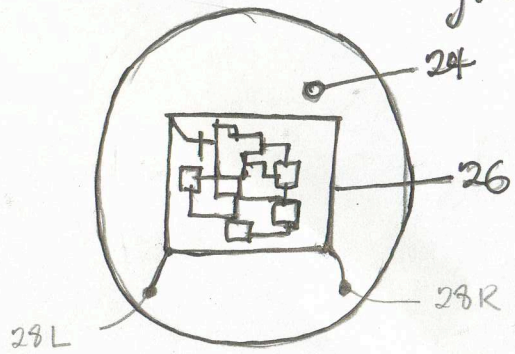


Fig. 4

Fig. 5



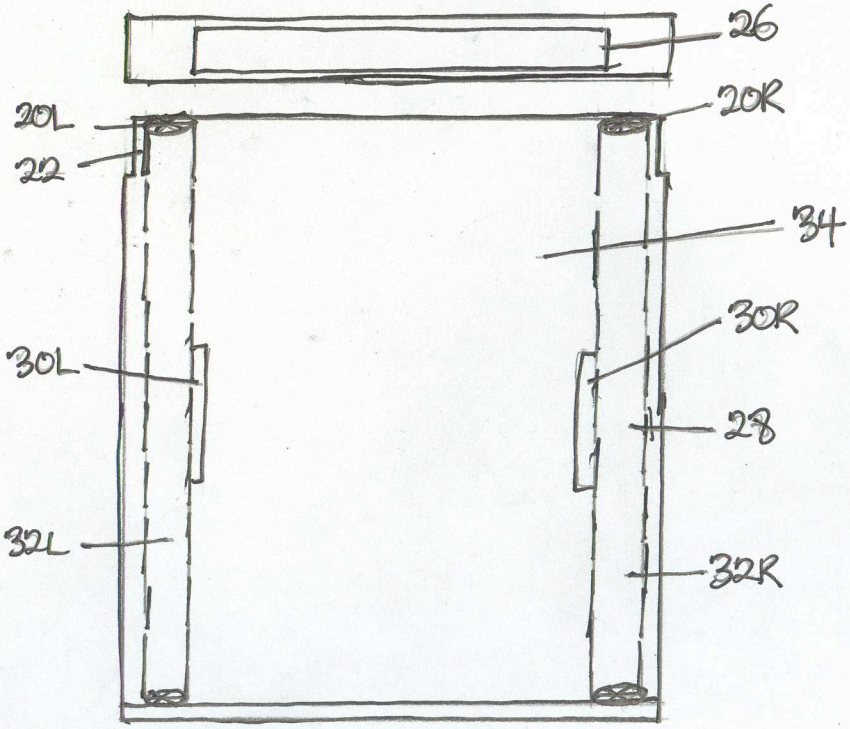


Fig. 6

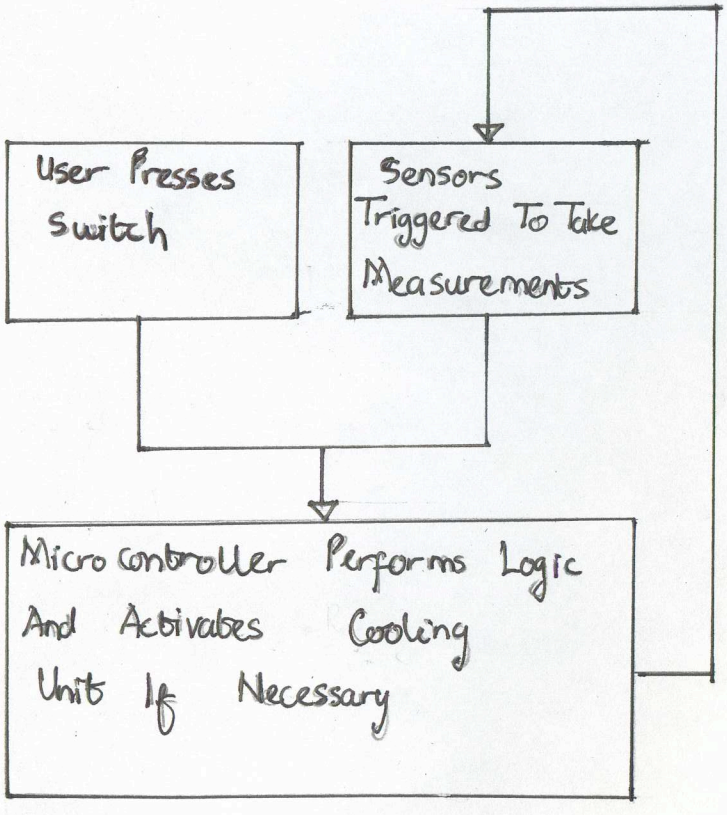


Fig. 7

Fig. 8

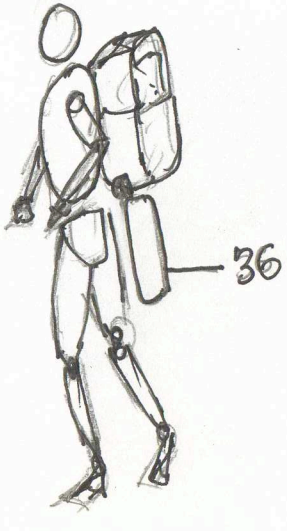


Fig. 9