Title

SECURITY CAMERA ENCLOSURE USING A THERMAL CONTROL

INVENTORS

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FIELD OF INVENTION

[0001] This subject matter disclosed herein provides multiple one or more components of a heating or cooling enclosure for a security camera. Specifically, the enclosure maintains temperatures within a particular range of temperature for operation of the security camera located therein.

BACKGROUND

[0002] It is known that security cameras often need to be placed in extreme environmental conditions. Some of these environments may include, for example, extremes of temperature, humidity, moisture, or solar radiation. For one of these factors, temperature, many or most of the electronic devices inside a camera system must be kept within a specific temperature range. For example, a drastic temperature change can occur when cameras are implemented in locations such as Dubai, where temperature are extreme from day to night. In other examples, the camera may be implemented where extreme cold temperatures (e.g., -40 °C or lower) may be present in the winter months and extreme warm conditions (e.g., +50 °C or higher) may be present in the summer months. In order to address these problems, a system that limits or reduces the variance from environmental conditions to affect temperatures and other factors inside the camera enclosure.

[0003] Various features and other aspects of the disclosed subject matter are explained in the following descriptions and can be seen in the accompanying figures:

[0004] FIG. 1 illustrates a generic camera enclosure system in a generic environment that is being viewed from a distance;

[0005] FIG. 2 illustrates one embodiment of the disclosed subject matter with the Peltier cooler, fin array, hood, and blower attached to the camera enclosure;

[0006] FIG. 3 illustrates an exploded view of the embodiment shown in FIG. 2.

[0007] FIG. 4 illustrates a lengthwise cross-sectional view of the embodiment shown in FIG. 2;

[0008] FIG. 5 illustrates an embodiment with a solar panel above the camera enclosure and cooling system shown in FIG. 2;

[0009] FIG. 6 illustrates an exemplary block diagram of the camera enclosure and cooling system shown in FIG. 2;

DETAILED DESCRIPTION OF THE DRAWINGS

[0010] In one embodiment, the disclosed subject matter provides a heating and cooling system that uses a combination thermoelectric heater and cooler (the thermoelectric device that utilizes the Peltier effect to create a heat flux between junctions of two different types of materials. The thermoelectric device is positioned above the camera in a barrier to create two different enclosures. The thermoelectric device has a cold side and a hot side. For cooling effects, the cold side of the thermoelectric device is positioned in the same enclosure as the camera, while the hot side is positioned outside the same enclosure as the camera. For heating effects, the hot side of the thermoelectric device is positioned in the same enclosure as the camera, while the cold side is positioned outside the same enclosure as the camera. In a specific exemplary embodiment, the hot side of the thermoelectric device is thermally pasted to a fin array that rests on top of the camera enclosure. In other embodiments, the fin array may be located in other positions on, or distal to, the camera enclosure. Additionally, a

hood may be placed on and around the fin array to make an enclosed fin array. A blower may be placed at the end or one side of the fin array to pull air over the fin array. In the cool compartment, a thermal sensor may be used to turn on and off the thermoelectric cooler at any desired temperatures. There is a fan to circulate air inside of the cold compartment to keep the security camera cool.

[0011] In one embodiment, the hot compartment is underneath the cold compartment. In one embodiment, the hot compartment is in back of the cold compartment. In one embodiment, the camera enclosure has a reflective material on the outer surfaces of the enclosure. In one embodiment, the reflective material may be located on the inner surfaces of the enclosure.

[0012] In one embodiment, the hot compartment is on top of the cold compartment and a solar panel is fixed on top of the camera enclosure. Additionally, the camera enclosure may have a reflective material on the outer surfaces. In one embodiment, the hot compartment is in back of the cold compartment and a solar panel is fixed on top of the camera enclosure. Additionally, the camera enclosure may have a reflective material on the outer surfaces.

[0013] In one embodiment, the hot compartment is underneath the cold compartment and a solar panel is fixed on top of the camera enclosure. Additionally, the camera enclosure has a reflective material on the outermost surfaces.

[0014] The description that follows includes illustrative systems, methods, and techniques that embody the subject matter. In the following description, for purposes of explanation, numerous specific details are set forth to provide an understanding of various embodiments of the subject matter. It will be evident, however, to those skilled in the art that embodiments of the subject matter may be practiced without these specific details. Further, well-known operations, structures, and techniques have not been shown in detail.

[0015] Moreover, as used herein, the term "or" may be construed in either an inclusive or exclusive sense. Similarly, the term "exemplary" is construed merely to mean an example of something or an exemplar and not necessarily a preferred or ideal means of accomplishing a goal. Additionally, although various exemplary embodiments discussed below focus on an enclosure for a security camera, the embodiments are given merely for clarity in disclosure. Thus, any type of camera or other type of electronic device can employ various embodiments of the system and method described herein and are considered as being within a scope of the present inventive subject matter.

[0016] Referring first to FIG. 1, in one embodiment of the disclosed subject matter, a horizontal beam 105 and a camera enclosure 102 are being supported by a vertical beam 103. The vertical beam 103 may be secured to the ground 104 by means of cement or other methods known independently in the art. The vertical beam may comprise wood, stell, various plastics, or other support structures. From the vertical beam 103, the horizontal beam 105 is shown to be protruding to the right for the purpose of placement of the camera enclosure 102 to meet the consumers' needs, such as locating the camera in an elevated position above the ground 104 to better surveil a given area. The horizontal beam 105 is considered to be part of the vertical beam as a single "stand." The vertical beam 103 and the horizontal beam 105 may change in length and height as to meet the consumers' needs as discussed, above. FIG. 1 also shows a direct frontal view of the camera enclosure 102 with one embodiment of the cooling system 101 directly above camera enclosure 102. The outer surfaces of the camera enclosure 102 and the cooling system 101 may be covered with a reflective material 107, such as a reflective vinyl material, which has one intended use of reducing the radiation aspect of the solar load.

[0017] In FIG. 2, the camera enclosure 102 has a fin array 203 thermally pasted to the top of the camera enclosure 102. A blower 201 is shown to be placed in the rear of the fin array 203 and on top of the camera enclosure 102. In other embodiments, the blower 201 may be placed in other positions relative to the fin array 203. For example, the blower 201 may be placed ahead of or to the side, top, or bottom of the fin array 203. The blower 201 pulls surrounding air over the fin array 203 from, for example, the front of the camera enclosure 102 and expels it out the rear of the fin array 203 towards the

rear of the camera enclosure 102. In a specific exemplary embodiment, the blower 201 is a DC crossflow fan manufactured by Sofasco Inc., located in Winchester, Virginia, US.. Additionally, a hood 202 may be placed over the fin array 203 and the blower 201 to improve the airflow. The hood 202 may be fabricated from, for example, materials including polypropylene, polyethylene, other thermoplastics, aluminum or other metals.

FIG. 3 shows an exploded view of the camera enclosure 102 and the cooling system 101 shown in FIG. 1. In this embodiment, a bottom portion 305 of the camera enclosure 102 has a view window 304 for the camera 303 to look through. The view window 304 may be comprised of glass or plexiglass, even double paned and filled with argon or another low-thermal conductive gas. The bottom portion 305 of the camera enclosure 102 supports a cross flow blower 307 that circulates air inside of the entire camera enclosure 102 shown in FIG. 2. Above the blower 307, on the back side of the bottom portion of the a thermal sensor 306. The top portion of the camera enclosure 308 has a hole 302 or other aperture cut into it to allow a thermoelectric cooler 301 to rest with the cold side facing inside and the hot side facing outside. When cooling this is the proper setup. However, if the hot side wanted to be the cold side and visa versa, the DC current being applied needs to be reversed. The fin array 203 sits on top of the top portion 308 of the camera enclosure 102 and has a groove on the underside to fit the thermoelectric cooler 301. In this embodiment, the blower 201 is placed towards or in rear of the fin array 203 to pull ambient air there over. Finally, the hood 202 is placed over the fin array 203 and the blower 201 to improve the flow of air over the fin array 203 and thereby provides better convective cooling for the camera 303. FIG. 4 shows a cross-sectional view of the camera enclosure 102 and the cooling system 101 shown in FIG. 1. FIG. 4 shows alone way in which the various components may fit together inside of the camera enclosure 102. A person of ordinary skill in the art can readily envision other ways in which the components may be arranged upon reading and understanding the disclosure provided herein. Blades 401 of the blower 201 is shown clearly, along with spacing between the blower 201 and the fin array 203, under the hood 202.

[0018] FIG. 4 shows a cross-sectional view of the camera enclosure 102 and the cooling system 101 shown in FIG. 1. FIG. 4 shows alone way in which the various

components may fit together inside of the camera enclosure 102. A person of ordinary skill in the art can readily envision other ways in which the components may be arranged upon reading and understanding the disclosure provided herein. Blades 401 of the blower 201 is shown clearly, along with spacing between the blower 201 and the fin array 203, under the hood 202.

[0019] FIG. 5 shows the camera enclosure 102 with the cooling system 101 above it resting on a bracket 503. In this embodiment, the bracket 503 supports a solar panel 501, with horizontal supports 502 connecting the bracket 503 and the solar panel 501. In a specific exemplary embodiment, the solar panel 201 is composed of three 15-watt solar panel kits manufactured by Chicago Electric Power Systems and purchasable through Harbor Freight Tools, headquarters located at 3491 Mission Oaks Boulevard, Camarillo, CA.. The solar panel 501 may help power the thermoelectric cooler 301. In other embodiments, the thermoelectric cooler 301 may be powered by, or in addition to the solar panel 501, by, for example, batteries or another type of power supply (e.g. an AC power supply). The solar panel 501 may help power the thermoelectric cooler 301. In other embodiments, the thermoelectric cooler 301 may powered by, or in addition to the solar panel 501, by, for example, batteries or another type of power supply (e.g., an AC power supply).

[0020] FIG. 6 show the block diagram for the combination of the cooling system 101 and the camera enclosure 102. First the ambient temperature 601 may affect the internal temperature 602 of the camera enclosure 102. When the internal temperature 602 reaches a specified temperature the thermal sensor 306, the blower 201, the thermoelectric cooler 301, and the internal blower 307 activate to maintain the internal temperature at or close to a desired value of temperature. The blower 201 draws the heat from the thermoelectric cooler 301 using the fin array 203 to remove the internal heat. The cooling system 101 takes these components to maintain the internal temperature.

CLAIMS

What is claimed is:

1. A camera enclosure to house and regulate a temperature of the camera, the camera enclosure comprising:

a temperature sensor;

a thermoelectric device; and

a temperature adjustment component.

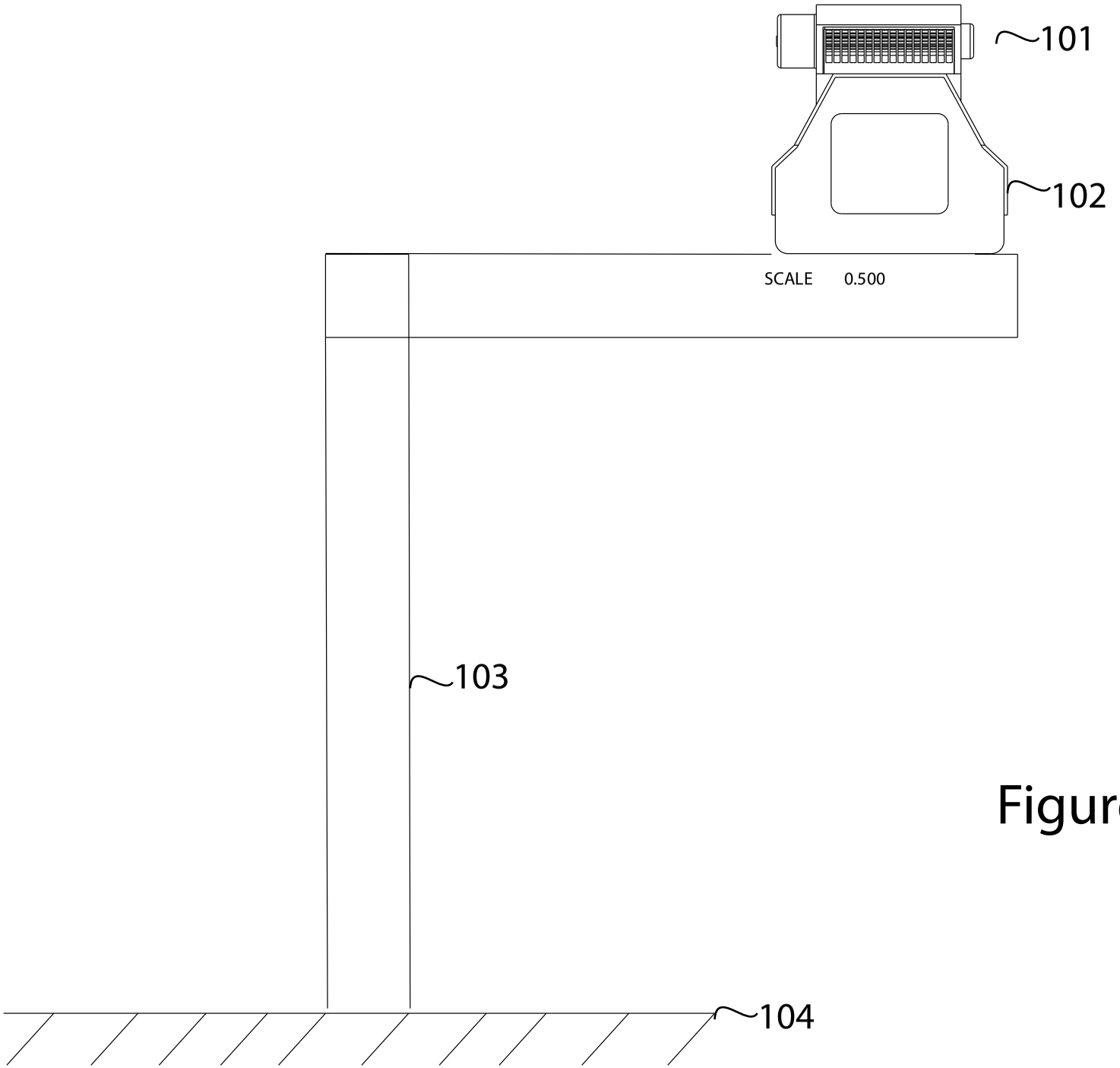

Figure 1