

SECURED HANGER FOR EMERGENCY EQUIPMENT

The present invention relates to secured hanger for emergency equipment. In particular, the present invention pertains to a tamper-proof
5 hanger for securing fire extinguisher or other emergency equipment.

Fire extinguishers or other emergency equipment are often encased to discourage vandals and other unauthorized individuals from tampering with such equipment. Fire extinguisher hereinafter is used interchangeably
10 with emergency equipment of all types. The casing includes a metal housing having at least one glass panel the breakage of which alerts the building owner or the security personnel that the fire extinguisher has been used.

Recently, alarm has been incorporated as part of the tamper-proof
15 casing for fire extinguisher. Specifically, fire alarm is triggered when a small glass on the alarm is broken. However, the improved fire extinguisher alarms do not minimize the chance of vandals tampering with the fire extinguisher. More recently U.S. Patent No. 5,153,567 teaches a fire extinguisher mounting plate incorporating a flashlight and an audible alarm
20 which are triggered by the removal of the extinguisher canister. Nevertheless, the existing fire extinguishers are not sensitive to the contents within the canisters. A change in the contents of the canister is usually detected by a pressure gauge which is coupled with the fire extinguisher. Again, the pressure gauge are vulnerable to tampering or accidental
25 breakage.



It is an object of the present invention to alert the security personnel when the fire extinguisher is tampered or being used for emergency purposes.

5 It is a further object of the present invention to improve the tamper-proof features of the fire extinguisher system by rendering it sensitive to the change in weight of the contents within the canister of the fire extinguisher.

10 The present invention comprises of a hanger assembly having at least one cylindrical channel through which a wire rope or a rod is inserted. One end of the wire rope terminates with a hook on which a fire extinguisher is hung. The other end of the wire rope terminates in a stopper which together with a cam and spring subassembly within the channel acts as a lever for a sensor located adjacent the channel. The distance the stopper travels along the longitudinal axis of the channel corresponds to the weight of the contents
15 within the canister of the fire extinguisher. As such, any discharge of the fire extinguisher shall be detected by the sensor which triggers a alarm circuit.

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FIG. 1 shows a perspective, right side, elevational view of an embodiment of the present invention incorporating a casing, a hanger assembly, and a cam and spring subassembly.

- 5 FIG. 2 is a flow chart illustrating the steps the control circuit enhances the tamper-proof features of the present invention.

FIG. 3 is a detailed description of the control circuit of the present invention.



FIG. 1 is a perspective, right side, elevational view of a hanger 5 incorporating a casing 10 and a hanger assembly 50 of the present invention. The casing 10 further includes a front panel 15 and a rear panel 30 (not shown). The front panel 15 is hinged and coupled to one of the four sides of the casing 10 such that it can be swung and closed. The front panel 15 is secured to the casing 10 with a lock 25. Optionally, a reset key switch can be installed as part of the lock 25. In FIG. 1, the rear section of the front panel 15 is illustrated having a control circuit 20 attached to the rear surface of the front panel . As shall be described in FIGS 2 and 3, the control circuitry 20 not only calibrates the sensor but also alarms the security personnel of any tampering or real emergency use of the fire extinguisher which is attached to the hanger 5. Optionally a strip of gasket is coupled to the outer border of the rear side of the front panel 15 for insulating any gap between the front panel and the casing.

Referring again to FIG. 1, the hanger 5 of the present invention further comprises a back plate 35 which in turn is mounted on any flat and vertical surface of a building or dwelling with a housing support 40. The key components of the present invention, however, comprises a hanger assembly 50. The assembly 50 further comprises a channel member 55, a spine 60, a sensor, and a bracket 70. The channel member 55 has preferably a rigid, cylindrical shape and a slot 62 running the length of the channel member. The spine 60 is substantial the same length as the slot 62. The spine is also bonded to one of the side wall of the slot such that a smaller opening on the channel member remains. The channel member is hollow such that a cam 75 and a spring 90 can be inserted therethrough. One end of the spring is biased against the back plate 35 while the other end the cam 75. The cam 75 has a lever 78 which extends orthogonal outwards from the longitudinal axis of the cam. In FIG. 1, the width of the



of the slot 62 such that the lever can slide in parallel with the longitudinal axis of the channel member 50.

In FIG. 1 a wire rope or rod 80 is inserted concentrically through the channel member 50 and the cam 75. The end of the wire rope closer to the cam 75 terminates with a stopper 85. The other end of the wire rope terminates with a hook 95 upon which a fire extinguisher (not shown) is hung. The stopper 85 has an outer diameter larger than the inner diameter of the cam. As such, the cam and spring subassembly slides within the channel member 50 along and in parallel with the longitudinal axis of the channel member. A sensor 65 is located on the spine 60 for detecting the location of the lever 78. In the preferred embodiment of the present invention, the sensor is a limit switch. The sensor 65 is coupled to the control circuit board 20 where its gate is monitored. A power source 90 and an alarm 100 are also shown adjacent to the hanger assembly 50 and each coupled to the control circuit 20. The power source 98 furnishes power to the both the control circuit 20, the sensor 65 and the alarm 100. The alarm triggers an audible buzzer upon certain conditions of which the details shall be elaborated further below.

FIG. 2 is a flow chart illustrating the steps in which the control circuit 20 enhances the tamper-proof features of the present invention. As mentioned above in the description of FIG. 1, the control circuit 20 is coupled to a power source (usually on-line and not shown in the figures), the sensor 65, an auxiliary power source 98 and the alarm 100. In step 102, the control circuit 20 initializes the hanger assembly 50. Next, it checks whether the on-line power is on. This is crucial as in most emergencies, the on-line power source is cut off. If the on-line power source is not available, the control circuit 20 activates the auxiliary power source 98. Then, it turns on the power indication light in step 108. Here, it should be understood by one



skilled in the art, a light for illuminating the immediate surrounding of the hanger 5 is contemplated in addition to the indication light. The control circuit 20 checks in step 110 whether the sensor 65 is in order. With respect to mechanical sensors such as a limit switch, the check is straight forward:
5 the circuit checks for the appropriate current of resistance level. For other sensors, the control circuit 20 may have to calibrate certain instrumentation. If the sensor 65 is faulty, the control circuit 20 activates the faulty system indicator light in step 112 and resets the alarm 100 in step 118.

Referring again in FIG. 2, the control circuit 20 proceeds to test
10 whether the fire extinguisher is overweight or underweight in step 114. The feedback on the weight of the canister is provided by the sensor 65 and the lever 78 of the cam. If the fire extinguisher is removed from the hook 95 by for example a fireman, an underweight condition will be flagged. Likewise, if vandal discharges the fire extinguisher partially and returns it to the hanger,
15 the control circuit 20 detects a similar underweight. For the overweight scenario, vandals may discharge the canister completely and attempts to replace with substitute substance. Referring again to step 114, if the correct weight of the fire extinguisher is detected, the control circuit 20 returns to step 104 and continues the monitoring loop. However, if the incorrect weight
20 is determined, the control circuit 20 triggers in step 116 the alarm 100 which may be connected to a centralized monitoring system to alert security personnel. At the same time, the control circuit 20 checks in step 118 whether the alarm 100 has being reset. If not, the control circuit 20 activates the buzzer in step 120.

25 FIG. 3 is a detailed description of the control circuit 20 of the present invention. The control circuit comprises a sensor circuit 125, an auxiliary power source 130, a testing circuit 135 and an alarm circuitry 140. The sensor circuit 125 is physically located on the spine 60; it comprises an input



jack 148 for connecting the sensor circuit 125 to an external on-line power source (not shown in the figures). The input jack 148 is coupled to the sensor 65. In the preferred embodiment of the present invention, the sensor 65 is a limit switch. When the fire extinguisher contains the standard or correct weight, the lever 78 contacts the sensor 65 and closes the gate. Referring again to FIG. 3, the sensor 65 is further coupled to a power regulator circuit 155 and a power on lamp 160. The power regulator circuit 155 steps the AC voltage down to DC voltage V_+ for the controller circuit 20. The power on lamp is preferably a LED or equivalent device. The sensor circuit 125 provides a DC voltage V_+ to terminal 165 of the testing circuit 135 as well as that of alarm circuit 140.

In FIG. 3 the auxiliary power source 130 consists of an auxiliary cell 132 for providing back-up power to the testing circuit 135 and the alarm circuit 140 in the event the external AC power source is not available. The testing circuit 135 comprises a testing switch 170, comparators 172 and 174, transistors 176 and 180, and a system fault lamp 178. The testing circuit 135 enables the user to check whether the indicators lamps, alarm and buzzer are functioning properly. Once the user presses the testing switch 170, the alarm in the alarm circuit as well as the buzzer 145 shall be activated. In the preferred embodiment of the present invention, the testing switch 170 is a push button switch. As soon as the user releases the testing switch 170, the buzzer 145 is de-activated. However, the alarm lamp in the alarm circuit remains activated. The alarm will have to be reset.

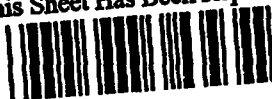
Again in FIG. 3, the alarm circuit 140 comprises a transistor 182, transistors 184, 188 and 190, an alarm lamp 186, a reset switch 192 and a resistor 194. The reset switch 192 enables the user to de-activate the alarm lamp after one checks the control circuit for system fault. The transistor 190 is a latching circuit and cooperates with the transistor 182 to activate the



buzzer when the sensor 65 detects an incorrect weight for the fire extinguisher (in the case, the sensor 65 is opened). Should this scenario occur, the transistor 184 shall also be biased to activate the alarm lamp 186. In the preferred embodiment of the present invention, the alarm lamp 186 is
5 a LED. The resistor 194 interposed between the transistors 182 and 190 prevents excess current from flowing the latching transistor 190.

While the present invention has been described particularly with reference to FIGS. 1 to 3 with emphasis on a method and apparatus for securely hanging a fire extinguisher, it should be understood that the
10 figures are for illustration only and should not be taken as a limitation on the invention. In addition, it is clear that the method and apparatus of the present invention has utility in many applications where emergency equipment are involved. It is contemplated that many changes and
15 modifications may be made by one of ordinary skill in the art without departing from the spirit and the scope of the invention as described.

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**Claims**

1. A secured hanger for emergency equipment comprising:
 - (a) a hanger assembly for detecting the weight of the emergency equipment, said hanger assembly further comprising a channel, a spine and a sensor, said channel being a hollow cylinder having a slot along the length thereof, said spine being coupled to one side wall of said slot, said sensor being located on said spine;
 - (b) a wire rope insertable through said channel for relating the distance along channel with the weight of said emergency equipment, one end of said rope being used for hanging said emergency equipment;
 - (c) a stopper terminable at one end of said wire rope;
 - (d) a cam and lever subassembly insertable through said wire rope and within said channel for biasing against said stopper;
 - (e) a spring insertable through said wire rope and within said channel for biasing against said cam, the resistance of said spring corresponding to the correct weight of said fire extinguisher; and
 - (f) a control circuit coupled to said sensor for detecting the weight of said fire extinguisher, said control circuit further having a testing circuit for checking integrity of said control circuit.
2. The secured hanger in claim 1 wherein said sensor is a limit switch.



1 3. The secured hanger in claim 1 wherein said control circuit is
2 activated by an auxiliary power source.

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1 4. A secured hanger substantially as hereinbefore described with
2 reference to or as shown in the accompanying drawings.

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