

TITLE OF THE INVENTION**A COMBINATION WORD SIGN OR PICTOGRAM AND EMERGENCY LIGHTING UNIT****DESCRIPTION OF THE PRIOR ART****1. Field of the Invention**

5 The invention relates generally to battery operated emergency lighting, (external illuminated) and self-illuminated, (internally illuminated) sign fixture and particularly relates to combinations of illuminated exit signs and the like with emergency lighting unit.

2. Background of the Invention

10 Emergency lighting is mandated by building regulations throughout the world, especially for highrise commercial buildings. The most common type of emergency lighting is EXIT sign indication, which is also the most noticed emergency indication as a result of non-stopping illumination and are therefore readily seen. Exit signs are typically placed above doorways or in each floor of staircase to indicate the direction of escape route in exiting a building in a time of emergency.

15 It is a fact that emergency lighting operates in the event of emergency and is intended to provide appropriate illumination under emergency condition such as the loss of normal power. Since emergency conditions requiring the most immediate and effective use of both exit signs and emergency lighting units are normally associated with mains power loss, backup power is necessary for the continued operation of an exit sign and for start-
20 up and continuing operation of an emergency lighting unit. However the back-up power is provided by batteries, a typical exit sign having a battery and circuitry capable of switching to backup battery power from AC (mains power) on loss of AC (main power) to the exit sign.

25 As a result of the possibility for malfunction of the battery of the emergency lighting, in most cases, the emergency lighting would failed to operate in time of emergency or power outage due to battery failure. Accordingly, it is a long felt need to provide an emergency lighting that requires either no battery or very least battery energy to operate the emergency lighting.

30 There is also a variety of emergency lighting systems being known in the prior art and fundamentally these systems ensure that if a source of AC power which provides the normal or regular lighting for a given environment should for any reason fail, emergency

lighting is furnished. Generally what this involves is an automatic switching over from the normal or regular AC supply to an encased battery supply which furnishes the needed current to a lamp within the emergency lighting system.

5 GB Patent No. 1 498 483 discloses an emergency lighting system which comprises both sound and light sources disposed along the fixed escape route, and where the light sources may be caused to emit light sequentially so that the light is perceived to travel along the fixed, predetermined escape route in one direction only, towards one specific emergency exit. This GB Patent appears that the light sources are mounted on the wall approximately at head level above the floor in e.g. corridors, in such a way that there will
10 be long voids between the light sources at door openings and openings to branching corridors as well as in open spaces, such as lobbies. Such discontinuities in the visual marking of the escape route contribute to the necessity of completing the system with sound sources which not only makes the system more expensive, but also the installation and operation of the same.

15 With the systems described in GB Patent Application No. 2 215 105 and U.S. Pat. No. 4,347,499, respectively, attempts are made to overcome this problem by connecting the light sources to a control device linked to sensors disposed to detect possible blocking of corresponding emergency exits and which, if a blocking is detected, automatically provides for control of the travelling light from the light sources in the direction of exits
20 which are not detected as being blocked. With the system described in GB Patent Application No. 2 215 105 it is also possible to initiate evacuation manually by means of trigger devices disposed along the escape routes. However, the escape route pattern which automatically adapts to the detected blockings cannot be amended, even when there are reasons for interfering and take command of the automatic system, which may
25 desirable e.g. in the event of an incorrectly detected blocking, or by a blocking of an exit, or the safety zone behind this, which cannot be detected automatically.

A further disadvantage by the systems known from the publications mentioned above, is that their signal sources with the corresponding connecting wires, housing for integral mounting, and so on, are not particularly well suited for post-installation in buildings and
30 crafts. For example, the light source housings which in U.S. Pat. No. 4,347,499 are shown lowered into recessions in the floor between the cabin and the cargo room of a passenger aircraft, would weaken the structure of the floor to such a large extent that utilization in practice hardly is permissible.

There are three types of emergency exit signage available in the market, such as those fabricated using luminares material with backup batteries, using radioactive materials without backup batteries, and using photoluminescence PL without backup batteries. However, the short comings of these available emerging lighting include failure to comply with local fire code.

US Patent Publication 20160330811 discloses a constant power backup power supply for LED lighting fixtures . The power supply includes a storage battery that is charged while an AC power source is in an ON condition. When AC power transitions to an OFF condition, a capacitor bank charged by the battery supplies current to the primary side of a flyback converter operating in discontinuous conduction mode. The secondary side of the flyback converter supplies constant output power to the LED lighting fixture for an arbitrary output voltage within a predetermined range.

US Patent Publication No. 20080232102 discloses an emergency light fixture comprising: at least two light sources; and a reflector, the at least two light sources being at least partially disposed within the reflector, the reflector comprising a first concave surface formed by rotating a first curve about a first central axis of the first curve, the reflector comprising a second concave surface formed by rotating a second curve about a second central axis of the second curve, the reflector comprising a third concave surface formed by translating a third curve along a substantially straight line, the third concave surface intersecting the first concave surface and the second concave surface, the reflector forming a single cavity.

SUMMARY OF THE INVENTION

Thus, there is a need for a new emergency lighting and self-illuminated sign indicator whereby in according to the intended purpose in different emergency situations, is suitable for general applications, when it is desirable to guide a group of persons to a selected place, for instance within a building, such as a hotel, and where the light sources together with the associated equipment are designed to be post-mounted or suspended in a simple way on any substantially flat surface.

An object of the present invention is to provide an emergency lighting and self-illuminated sign indicator comprising (a) a word sign or pictogram; (b) a base photo luminescence

(PL) layer mounted immediately behind the word sign or pictogram, (c) a light distribution medium, mounted adjacently to the photoluminescence layer; (d) a light source to light up the light distribution medium that will evenly energize the base PL layer to provide self illumination; and (d) a light reflector mounted closely to the light distribution medium to reflect light to the PL layer, whereby the combination is lighted when there is a power failure to the light source.

Yet still a further object of the present invention is to provide an emergency lighting and self-illuminated sign indicator, wherein all PL material/sign is energized or charged by an external light source and discharge light when it is not energized.

Another object of the present invention is to provide an emergency lighting and self-illuminated sign indicator, wherein the entire surface of the PL will be energized by the lighted luminaires via a distribution or transmission panel.

Another main object of the present invention is to provide an emergency lighting and self-illuminated sign indicator, wherein the indicator has the advantages of environment friendly as compared to the existing products in the market.

Still a further object of the present invention is to provide an emergency lighting and self-illuminated sign indicator, wherein the PL panel is always fully charged by the internal luminaire therefore the use of backup batteries is eliminated.

Yet still a further object of the present invention to provide a combination word sign or pictogram and emergency lighting unit, further comprising compartment means for housing electrical circuitry operable with the light source.

Another objective of the present invention is to provide a combination word sign or pictogram and emergency lighting unit, further comprising a single housing being substantially formed of a plastic or metal material to contain the combination of the lighting unit.

Yet still another object of the present invention to provide a combination word sign or pictogram and emergency lighting unit, further comprising an illuminated/indicating light for identifying main AC power status, a push switch that enables temporary removing AC power to the combination.

BRIEF DESCRIPTION OF THE DRAWINGS

5 Fig. 1 is a perspective view of a conventional emergency lighting.

FIG. 2 is a perspective exploded view of a first embodiment of the invention.

10 FIG. 3 is a perspective exploded view of a second embodiment of the invention, wherein the pictogram or word is located at both side of the emergency lighting unit in accordance with the present invention; and

FIG. 4 is a front view of the embodiment of the invention shown in FIG. 1.

15 FIG. 5 is a section view of the emergency lighting unit in accordance with the present invention.

FIG. 6 is a perspective view of the emergency lighting unit in accordance with the present invention.

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FIG. 7 is an exploded view of another preferred embodiment of the emergency lighting unit in accordance with the present invention.

25 FIG. 8 is a table showing a comparison table of the brightness of the emergency lighting after the power supply is switched off, reading taken after power supply cut off being 0.3 lux for the self-luminous sing,

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

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As will be appreciated by the ordinary person skilled in the art, the various embodiments of the emergency lighting unit that are presented herein may operate in conjunction with a variety of other devices, equipment, etc., and as such, the embodiments presented herein are presented by way of example and are not intended to be limiting.

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FIG. 1 is a perspective view of a conventional emergency lighting available in the market.

Turning now to the drawings, FIGS. 2-4, in which similar elements are identified by similar numeral references throughout the various views and preferred embodiments of the disclosure.

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FIG. 2 provides a schematic view of structure for an exemplary embodiment of a combination word sign or pictogram and emergency lighting unit in accordance with the present invention. The combination word sign or pictogram is designated as (100) comprising (a) a word sign or pictogram (10), for instance a word like EXIT, and (b) a base photo luminescence (PL) layer (20) mounted immediately to the word sign or pictogram (10). A light distribution medium (30), mounted adjacently to the photoluminescence layer (20) is used to distribute uniformly the light to the photoluminescence material. A light source (40) is disposed close to the light distribution medium to deliver light energy to the medium (30) so as to energize the base PL layer (20) to provide illumination.

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15 The combination word sign or pictogram and emerging lighting unit is also provided with a light reflector (50) mounted closely to the light distribution medium (40) to reflect light to the PL layer (20). Accordingly, the combination unit will give illumination when there is a power failure to the light source.

FIG. 3 provides a schematic view of structure for another exemplary embodiment of a combination word sign or pictogram and emergency lighting unit in accordance with the present invention. In this preferred embodiment, the words or pictogram is two sided. The two sided combination structure comprises (a) a first word sign or pictogram (10); (b) a first base photo luminescence (PL) layer (20) mounted immediately to the first word sign or pictogram (10), (c) a light distribution medium (30), mounted adjacently to the first photoluminescence layer (20) ; (d) a light source (40) to light up the light distribution medium to energize the base PL layer (20) to provide self illumination; (d) a second photoluminescence PL layer (20') mounted on the opposite side and adjacent to the light distribution medium and (e) a second word sign or pictogram (10'), whereby the combination is lighted when there is a power failure to the light source.

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30 As shown in FIG. 3, there is shown a combination word or pictogram with emergency lighting unit 100 constituting a double-faced unit (100) having two word sign or pictogram (10, 10'). In a preferred embodiment, the unit 100 can be a direct wall-mounted installation on a fixture (not shown). In accordance with the present invention, the PL layer (20) is cooperating with the word sign or pictogram (10) to allow illumination when the light source

is being turned off. The base PL layer (20) is being energized by lighted luminaires connected to the light source (40).

Referring to FIGs. 2 & 3, the light distribution medium (30) distributes light from the light source (40) to the photo luminescence material layer (PL layer)(20, 20') to illuminate the words or pictogram (10,10'). The photo luminescence material (20) is the medium energized by the light source (40).

In a preferred embodiment of the present invention, the combination word sign or pictogram and emergency lighting unit (100) can further include a compartment means which is used to house an electrical circuitry operable with the light source (40). The emergency lighting unit (100) can be optionally mounted within a housing which is formed of a plastic or metal material to contain the combination of the lighting unit (100), further comprising an illuminated/indicating light for identifying main AC power status and a switch that enables temporary removing AC power to the light source (40).

In another preferred embodiment of the present invention, the combination word sign or pictogram and emergency lighting unit comprises (a) a word sign or pictogram (10) printed on a photo luminescence (PL) layer (20); (b) a light distribution medium (30) having mounted with a light source (40) being mounted adjacently to the photoluminescence layer (20); and (c) a light reflector (50) mounted closely to the light distribution medium to reflect light to the PL layer (20), whereby the combination is lighted when there is a power failure to the light source.

In accordance with the present invention, an electrical circuitry is provided operable with the light source. A compartment means is to house the electrical circuitry. Similarly, a housing is used to contain the lighting unit, and the housing is made of plastic or metal material.

FIG. 4 is a perspective view of the combination word sign or pictogram and emergency lighting unit in accordance with the present invention. In the preferred embodiment, the thickness of the components such as the word or pictogram (10), the PL layer (20), the light distribution medium (30) etc. are ranging from 4-8 mm, the entire unit (100) is small and is convenient to be installed and displayed.

FIG. 5 is a section view of the emergency lighting unit in accordance with the present invention.

FIG. 6 is a perspective view of the emergency lighting unit in accordance with the present invention. As shown in the figure, the light source (40) provides light energy to the light distribution medium (30), which then distributes light to the PL material (20).

5 In operation, in the event of an emergency due to power failure, the emergency lighting unit (100) will continue to be lighted as a result of the PL layer (20) as the PL layer (20) has been energized by lighted luminaires via the light distribution and transmission panel (30). Due to the fact that the PL layer or panel (20) is always fully charged by the internal luminaire, therefore no backup batteries are used. The combination of word sign or
10 pictogram and emergency unit of the present invention provides the best cost advantage when compared to all other types of market available emergency Exit signage.

FIG. 7 is an exploded view of another preferred embodiment of the emergency lighting unit in accordance with the present invention. As shown in the figure, a combination word
15 sign or pictogram and emergency lighting unit comprises (a) a word sign for instance EXIT or pictogram being printed onto a photoluminescence material or layer (20), (b) a light distribution medium (30), mounted adjacently to the photoluminescence layer (20), being used to distribute uniformly the light to the photoluminescence material. A light source (40) is disposed close to the light distribution medium (30) to deliver light energy to the
20 medium (30) so as to energize the base PL layer (20) to provide illumination. A reflector (50) is mounted closely to the light distribution medium (30) and the light source (40) to reflect light to the PL layer (20). In this preferred embodiment, when the light source (40) is not in operation due to power failure, the signage EXIT will be seen as a result of the photoluminescence material and the light distribution medium (30).

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FIG. 8 is a table showing a comparison table of the brightness of the emergency lighting after the power supply is switched off, reading taken after power supply cut off being 0.3 lux for the self-luminous sign. The table indicates that the self luminous sign is visible even the power supply is being cut off for a duration of 45 minutes.

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A compartment means is provided to the unit for housing an electrical circuitry which is operable with the light source. A backup power source, such as a battery, is disposed within the compartment.

35 The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, such as replacing the light distribution/transmission

panel with a number of LEDs or equivalent lighted assembly to energize the PL panel, and the luminaires may be either in the front or back of the PL panel or any direction; and it is, therefore, desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being made to the appended claims rather than
5 to the foregoing description to indicate the scope of the invention.

What is claimed is:

1. A combination word sign or pictogram and emergency lighting unit, the combination comprising (a) a word sign or pictogram printed on a photo luminescence (PL) layer; (b) a light distribution medium having mounted with a light source being mounted adjacently to the photoluminescence layer; and (c) a light reflector mounted closely to the light distribution medium to reflect light to the PL layer, whereby the combination is lighted when there is a power failure to the light source.
2. A combination word sign or pictogram and emergency lighting unit, the combination comprising (a) a word sign or pictogram; (b) a base photo luminescence (PL) layer mounted immediately to the word sign or pictogram, (c) a light distribution medium, mounted adjacently to the photoluminescence layer; (d) a light source to light up the light distribution medium to energize the base PL layer to provide self illumination; and (e) a light reflector mounted closely to the light distribution medium to reflect light to the PL layer, whereby the combination is lighted when there is a power failure to the light source.
3. The combination word sign or pictogram and emergency lighting unit as set forth in Claim 1 or 2, wherein the PL layer is cooperating with the word sign or pictogram to allow illumination when the light source is being turned off.
4. The combination word sign or pictogram and emergency lighting unit as set forth in Claim 1 or 2, wherein the base photoluminescence layer is being energized by the light distribution medium or luminaires connected to the light source.
5. The combination word sign or pictogram and emergency lighting unit as set forth in Claim 1 or 2, wherein the light distribution medium distributes light from light source to the photo luminescence material to illuminate the words or pictogram.
6. The combination word sign or pictogram and emergency lighting unit as set forth in Claim 1 or 2, wherein the photoluminescence material is the medium energized by the light source.
7. The combination word sign or pictogram and emergency lighting unit as set forth in Claim 1 or 2, further comprising compartment means for housing an electrical circuitry operable with the light source.

8. The combination word sign or pictogram and emergency lighting unit as set forth in Claim 1 or 2, further comprising a single housing being substantially formed of a plastic or metal material to contain the combination of the lighting unit.

5 9. A combination of word sign or pictogram and emergency lighting unit, the combination comprising (a) a word sign or pictogram printed onto a photo luminescence (PL) layer mounted immediately to the word sign or pictogram, (b) a light distribution medium, mounted adjacently to the photoluminescence layer; (c) a light source to light up the light distribution medium to energize the photoluminescence material layer to provide self illumination; and (d) a light reflector mounted closely to the light distribution
10 medium to reflect light to the PL layer, whereby the combination is lighted when there is a power failure to the light source.

10. The combination word sign or pictogram and emergency lighting unit as set forth in Claim 9, further comprising a single housing being substantially formed of a plastic or metal material to contain the combination of the lighting unit.

15 11. The combination word sign or pictogram and emergency lighting unit as set forth in Claim 9, further comprising compartment means for housing an electrical circuitry operable with the light source.

12. The combination word sign or pictogram and emergency lighting unit as set forth in Claim 7, wherein a backup power source is disposed within the compartment.

20 13. The combination word sign or pictogram and emergency lighting unit as set forth in Claim 12, wherein the backup power source is a battery.