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(54) **Lighting device**

(57) A lighting device (1) has a casing (2) housing one or more light sources (7); the casing (2) is closed by a screen (15) defined by a plate (17) made of light-diffusing material, and by a mirror-effect reflecting layer (23) located on a surface (19) of the plate (17) on the

opposite side to the sources (7) to define a visible surface (24) of the screen (15); when the device is turned off, the reflecting layer (23) has the appearance of a mirror surface, and, when the device is turned on, the reflecting layer is substantially transparent to the light emitted by the sources (7).

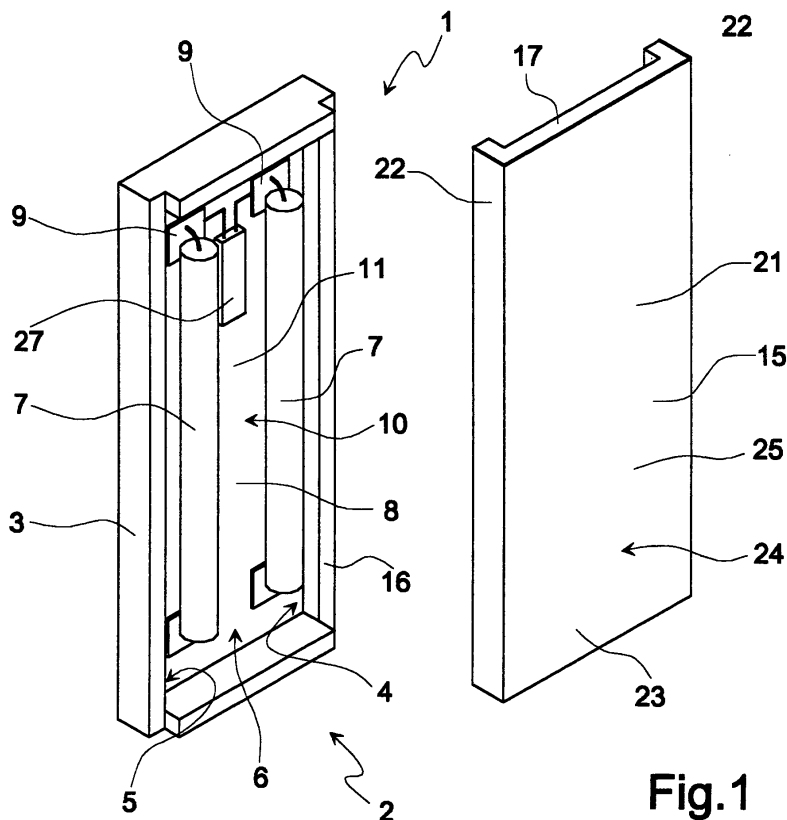


Fig.1

EP 1 376 007 A2

Description

[0001] The present invention relates to a lighting device designed to constitute a highly attractive multifunction furnishing element.

[0002] Interior lighting devices are known which have a light source housed inside a casing closed by a diffusing screen made of appropriate material to diffuse the light into the environment. The diffusing screen normally has a visible surface of a given colour and appearance when the light source is off, and which, when the light source is on, substantially maintains the same appearance, even though, obviously, illuminated by the light source.

[0003] In view of the constant search, in the furnishing industry, for new aesthetic effects, it is an object of the present invention to provide a lighting device permitting aesthetic and functional effects not obtainable from known devices, and which, in particular, assumes different appearances depending on whether the light source is on or off.

[0004] According to the present invention, there is provided a lighting device comprising at least one light source, and a screen facing the source, characterized in that said screen comprises a plate made of light-diffusing material, and a mirror-effect reflecting layer located on a surface of the plate on the opposite side to the source to define a visible surface of said screen.

[0005] More specifically, the reflecting layer has the appearance of a mirror surface when said source is off, and is substantially transparent when said source is on.

[0006] The lighting device according to the invention provides for entirely new aesthetic and functional effects, by assuming different appearances depending on whether the light source is on or off, and also combines the functions of a lamp with those of a mirror : when the source is off the visible outer surface of the screen defines a mirrorlike reflecting surface, whereas, when the source is on, the outer surface of the screen is transparent to the light emitted by the source and provides for illuminating the environment in which the device is installed.

[0007] The possibility of adjusting the brightness of the source also provides for gradually altering the appearance of the screen to obtain fading, semitransparency, partial reflection effects, etc.

[0008] The reflecting layer may advantageously be made using a so-called "sun-shield" or "sun-control" film used in the building industry, for automotive glazing, and in optics (for producing mirror lenses for sunglasses).

[0009] As is known, such films are defined by layers of polymer materials (typically polyester) incorporating a metallized layer (e.g. of vapourized aluminium) to produce a typically striking silvery appearance with a pronounced mirror effect, and are capable of reflecting up to 80% of incident solar energy (the typical value of reflected visible light being around 60%), and of absorbing practically all UV and IR radiation (typically, up to about

99% of UV radiation, and up to about 80% of IR radiation).

[0010] Such films are characterized by a "semireflecting" effect : when a glazed element fitted with a film of this type is placed between two environments of different light intensity, the glazed element is transparent on the lower light intensity side, and is substantially mirror-like on the higher light intensity side. When fitted with such films, therefore, room glazing, in normal daylight conditions, is fully transparent from the inside, but non-transparent with a mirror surface from the outside. Conversely, with predominant interior lighting (e.g. artificial light turned on in the room), the glazing is transparent from the outside.

[0011] Films of this sort have never been used in the lighting industry, and in particular in an application in accordance with the present invention. In addition to the aesthetic-functional effects mentioned, using such films in lighting devices in accordance with the invention ensures - given the high UV and, above all, IR radiation absorption typical of these films - the emission of a cold light with substantially no "hot" infrared component (as stated, these films absorb up to 80% of IR radiation and up to 99% of UV radiation).

[0012] Alternatively, the semireflecting effect typical of sun-shield films may be achieved in other ways, e.g. by vacuum deposition of thin metallized films on a substrate of polymer material; which substrate may even be defined by the outer surface itself of the plate of light-diffusing material. The optical effect of depositing these films on the plate is equivalent to applying a sun-shield film.

[0013] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic exploded view in perspective of a lighting device in accordance with the invention;

Figure 2 shows a section of a detail of the Figure 1 device.

[0014] Number 1 in Figure 1 indicates as a whole a lighting device, in particular an interior lighting device, designed, in the purely non-limiting example shown, for wall mounting.

[0015] Device 1 comprises a casing 2 having a concave body 3 comprising an inner cavity 4 and a front opening 5. A seat 6 is defined inside cavity 4 to house one or, as in the example shown, two light sources 7 defined, for example, by respective (known) linear fluorescent lamps side by side and parallel to each other. Sources 7 are housed inside seat 6 next to a back wall 8 of body 3, and are supported by respective (known) lamp-holders 9. For the sake of simplicity, the electric connections (known) connecting sources 7 to a power source are not shown.

[0016] Body 3 has a surface 10 defining seat 6 and

facing and partly surrounding sources 7 to define a diffusing reflector 11 for diffusing the light emitted by sources 7. For which purpose, surface 10 is substantially impervious to light, and is defined, for example, by an opaque white surface to retain the light emitted by sources 7 inside seat 6 and direct it towards opening 5.

[0017] A screen 15 is fixed to body 3 (in any known manner not described or illustrated for the sake of simplicity), faces sources 7, and is fitted to a peripheral edge 16 of body 3 bounding opening 5, so as to close opening 5.

[0018] With reference also to Figure 2, screen 15 comprises a plate 17 made of light-diffusing material, and having an inner surface 18 facing seat 6 and, therefore, sources 7 in use, and an outer surface 19 facing the environment for lighting in use and therefore located on the opposite side to sources 7.

[0019] More specifically, plate 17 is made of opal or translucent polymer material, e.g. polymethacrylate or similar material, having a degree of reflection (reflectance) of visible light preferably ranging between approximately 40% and 60%, and a degree of transmission (transmittance) of visible light ranging between approximately 60% and 40%.

[0020] Plate 17 is shaped to comprise a flat, e.g. rectangular, front wall 21 substantially parallel to back wall 8 of body 3; and two lateral walls 22 extending perpendicularly from respective lateral edges of front wall 21.

[0021] To surface 19 of plate 17 is applied a mirror-effect reflecting layer 23 defining a visible surface 24 of screen 15 and, therefore, of device 1. Reflecting layer 23 comprises two opposite faces, and is such that, when the faces are subjected to different light intensities, the face exposed to the higher light intensity has the appearance of a substantially mirrorlike reflecting surface, and the face exposed to the lower light intensity has the appearance of a substantially transparent surface.

[0022] Reflecting layer 23 (and hence the whole of screen 15 defined by plate 17 and reflecting layer 23) produces a mirror effect when sources 7 are turned off, whereas, when sources 7 are turned on, reflecting layer 23 (and screen 15 as a whole) is substantially transparent to the light emitted by sources 7.

[0023] More specifically, reflecting layer 23 has a degree of reflection (reflectance) of visible light of over approximately 70%, and a degree of transmission (transmittance) of visible light of less than approximately 30%, and is capable of absorbing over 70% (preferably about 80%) of IR radiation, and over 90% (preferably about 99%) of UV radiation.

[0024] By virtue of reflecting layer 23 and plate 17, screen 15 as a whole has a degree of reflection of visible light of over approximately 50%, and a degree of transmission of visible light of approximately 20% or less. Preferably, screen 15 has a visible-light reflectance of around 60%, and visible-light transmittance of around 20%.

[0025] Reflecting layer 23 is defined by a metallized

film 25 of polymer material, comprising two or more layers of polymer material (e.g. polyester) incorporating at least one metallized layer (e.g. vapourized aluminium). Film 25 has a silvery appearance with a pronounced mirror effect.

[0026] As stated, film 25 may, for example, be of the so-called "sun-shield" or "sun-control" type used in the building and automotive industries.

[0027] By way of example, Scotchtint™ films produced by 3M, in particular RE20SIARL, RE15SIX or equivalents, may be used. Obviously, other films of similar characteristics in terms of light, and in particular visible light, reflectance and transmittance may also be used.

[0028] Film 25 defining reflecting layer 23 is applied to surface 19, for example, by gluing with an adhesive layer 26 of suitable (known) adhesive. In a preferred embodiment, surface 19 of plate 17 to which reflecting layer 23 is applied is substantially smooth. In a variation, however, surface 19 is rough or otherwise not perfectly smooth.

[0029] If surface 19 is perfectly smooth and adhesive layer 26 is even, film 25 is also perfectly smooth to produce a homogeneous mirror effect and, when sources 7 are turned on, a homogeneous lighting effect. Conversely, any surface irregularities (due, for example, to roughness of surface 19 or unevenness of adhesive layer 26) produce different effects (glare, colour reflections, etc.), so that both the surface finish of surface 19 and the way in which the adhesive attaching film 25 is applied to surface 19 can be used to obtain special effects of the visible surface 24 of screen 15.

[0030] Alternatively, reflecting layer 23 may be defined by one or more metallized films applied directly to surface 19 (e.g. by a known vacuum deposition process) or to a substrate of polymer material in turn fixed to surface 19.

[0031] Device 1 also comprises a system 27 (known and therefore not described for the sake of simplicity) for adjusting the light intensity emitted by sources 7, and so obtaining further special lighting effects.

[0032] Clearly, changes may be made to the device as described and illustrated herein without, however, departing from the scope of the present invention.

Claims

1. A lighting device (1) comprising at least one light source (7), and a screen (15) facing the source (7), **characterized in that** said screen (15) comprises a plate (17) made of light-diffusing material, and a mirror-effect reflecting layer (23) located on a surface (19) of the plate (17) on the opposite side to the source (7) to define a visible surface (24) of said screen (15).
2. A device as claimed in Claim 1, **characterized in**

that said reflecting layer (23) has the appearance of a mirror surface when said source (7) is off, and is substantially transparent when said source (7) is on.

3. A device as claimed in Claim 1 or 2, **characterized in that** said reflecting layer (23) comprises two opposite faces, and is such that, when said faces are subjected to different light intensities, the face exposed to the higher light intensity has the appearance of a substantially mirrorlike reflecting surface, and the face exposed to the lower light intensity has the appearance of a substantially transparent surface.
4. A device as claimed in one of the foregoing Claims, **characterized in that** said reflecting layer (23) has a degree of reflection (reflectance) of visible light of over approximately 70%, and a degree of transmission (transmittance) of visible light of less than approximately 30%.
5. A device as claimed in one of the foregoing Claims, **characterized in that** said screen (15) has a degree of reflection (reflectance) of visible light of over approximately 50%, and a degree of transmission (transmittance) of visible light of approximately 20% or less.
6. A device as claimed in one of the foregoing Claims, **characterized in that** said reflecting layer (23) is capable of absorbing over approximately 70%, and preferably about 80%, of IR radiation, and over 90%, and preferably about 99%, of UV radiation.
7. A device as claimed in one of the foregoing Claims, **characterized in that** said reflecting layer (23) is defined by a metallized film (25) of polymer material.
8. A device as claimed in Claim 7, **characterized in that** said film (25) comprises layers of polymer material, and at least one metallized layer.
9. A device as claimed in one of the foregoing Claims, **characterized in that** said plate (17) is made of opal or translucent, preferably polymer, material.
10. A device as claimed in Claim 9, **characterized in that** said plate (17) is made of material having a degree of reflection (reflectance) of visible light ranging between approximately 40% and 60%, and a degree of transmission (transmittance) of visible light ranging between approximately 60% and 40%.
11. A device as claimed in one of Claims 1 to 10, **characterized in that** the surface (19) of said plate (17) having said reflecting layer (23) is substantially

smooth.

12. A device as claimed in one of Claims 1 to 10, **characterized in that** the surface (19) of said plate (17) having said reflecting layer (23) is rough.
13. A device as claimed in one of the foregoing Claims, **characterized by** comprising a seat (6) for housing said source (7); said seat (6) having an opaque surface facing the source (7).
14. A device as claimed in one of the foregoing Claims, **characterized by** comprising a system (27) for adjusting the light intensity emitted by said source (7).

