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(71) Applicant: **COLEBRAND LIMITED**
London, W1R 6BE (GB)

(72) Inventor: **Tusch, Klaus Norbert**
London SW1 8RX (GB)

(74) Representative: **Foster, Mark Charles**
Edward Evans & Co.,
Clifford's Inn,
Fetter Lane
London EC4A 1BX (GB)

(54) Light transmitter

(57) A surveillance device 1 having an array of LEDs 11 to illuminate an area in front of the device, and a CCD camera 3 to receive infra-red radiation from the illuminated area. A cover 4 at the front of the device is transparent to only infra-red radiation. The camera 3 is provided in contact with the cover 4, to reduce the amount of infra-red radiation reflected off the cover 4 entering the camera 3. A directable tubular light source is also disclosed.

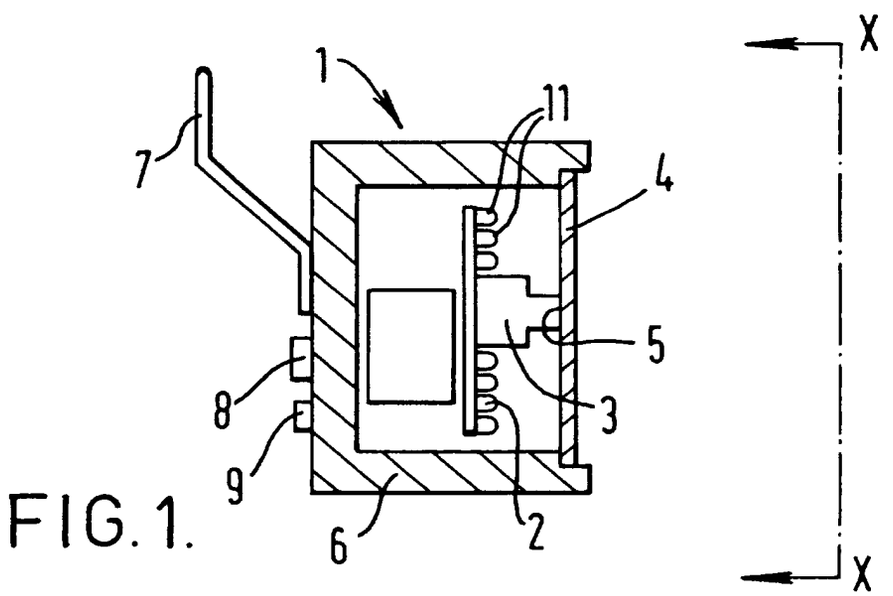

FIG. 1.

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Description

[0001] This invention is concerned with light transmission, and more particularly, but not exclusively, to a device for surveillance, and to a light source.

[0002] It is often desirable that surveillance devices be as unobtrusive and as unrecognisable as possible. In these cases, a simple, undisguised camera may be unacceptable because its presence would be obvious to persons to be observed. It is accordingly an object of this invention to seek to mitigate this disadvantage, and to provide a surveillance device which does not obviously resemble a surveillance device.

[0003] According to a first aspect of the invention, there is provided device for surveillance, including a cover, illumination means for emitting electromagnetic radiation through the cover, and a detector for detecting radiation through the cover, the cover obscuring said illumination means and said detector to the human eye.

[0004] According to a second aspect of the invention, there is provided a device for surveillance, including illumination means, a detector and a cover, wherein electromagnetic radiation emitted by the illumination means leaves the device through the cover, and wherein electromagnetic radiation of the same wavelength enters the device through the cover and is detected by the detector, the cover obscuring said illumination means and said detector to the human eye.

[0005] The cover may be substantially opaque to radiation visible to human eye.

[0006] The radiation receiving part of the detector is preferably adjacent the cover. This reduces or prevents detection by the detector of unwanted radiation which has reflected off the inside of the cover.

[0007] The radiation emitted by the illumination means may be infra-red radiation. Infra-red radiation is particularly advantageous for surveillance devices because it is invisible to the human eye.

[0008] The illumination means may be conveniently provided by an array of LEDs.

[0009] The detector may comprise a black and white CCD camera.

[0010] According to a third aspect of the present invention, there is provided a light source comprising a tube having a transparent wall, and a light source holder supported within the tube to locate a light source held thereon behind the transparent wall, the tube being formed with guide means to support the holder and to allow the holder to be moved axially of the tube.

[0011] The tube preferably comprises an opaque generally cylindrical portion formed with an axially extending slot, said transparent wall being mounted across said slot. The transparent wall is preferably plane.

[0012] The guide means preferably comprises two opposite axially extending recesses to receive said holder. The holder preferably comprises a circuit board on which one or more lamps are mounted.

[0013] The light source preferably comprises a mounting for said tube. The tube is preferably adjustably mounted in said mounting for relative movement about the tube axis. The tube preferably comprises a ridged outer region, the ridges extending axially of the tube, and the mounting preferably comprises means for engaging said ridges. The mounting preferably comprises means for partially encircling said tube.

[0014] The light source may comprise a plurality of said tubes, adjacent tubes being provided with electrical connector means for connecting the lamps of adjacent tubes. The electrical connection means is preferably arranged to allow relative movement between said adjacent tubes about their common axis.

[0015] Light in this specification is intended to cover any electromagnetic radiation, visible or invisible and the wall of the light source should be transparent to radiation from the source.

[0016] For a better understanding of the present invention, specific embodiments will now be described, by way of example, with reference to the accompanying drawings, in which:

[0017] Fig. 1 shows a plan cut-away view of a first embodiment according to the invention.

[0018] Fig. 2 shows a view along line X-X of the first embodiment in Fig. 1.

[0019] Fig. 3 shows a perspective view of a second embodiment according to the invention.

[0020] Figure 4 is a cross section of a tube carrying a lamp holder.

[0021] Figure 5 is a plan of a lamp holder removed from said tube.

[0022] Figure 6 is a diagram of a mounting clip engaging the tube of Figure 4.

[0023] A surveillance device 1 is shown in Fig. 1. The device 1 comprises illumination means 2, a detector 3 and a cover 4. The illumination means consists of about forty infra-red radiation emitting LEDs 11 arranged as a planar array facing the cover 4. The detector 3 is a black and white CCD camera which is sensitive at least to infra-red radiation, the camera protrudes from the centre of the array of LEDs and also faces the cover 4. In this embodiment, the camera is actually sensitive to a wide range of wavelengths from blue to infra-red. The cover 4 is a planar, rectangular sheet of material which is substantially transparent to infra-red radiation. The cover 4 is substantially opaque to visible light, and may be substantially opaque to all wavelengths other than infra-red.

[0024] The detector 3 has an input aperture 5 which is substantially in contact with the inside of the cover 4. The detector 3 and LEDs 11 are enclosed within a casing 6 for protection and support. The casing 6 may be made of any suitable material, for example plastics or metal. A bracket 7 is provided at the back of the casing 6 for attaching the device to walls, etc. The bracket may be made of any suitable material, such as plastics or metal.

[0025] At the back of the casing 6 there is a power input port 8 and a communications port 9. The power

input port 8 provides a connection for the input power to the LEDs and the camera. The communications port 9 provides a connection for the video output signal from the camera.

[0026] Figure 2 shows a view of the device 1 viewed along line X-X.

[0027] In use, the device 1 may be attached to a wall using the bracket 7. Power is supplied to the LEDs 11 and the camera 3 through the port 8. The LEDs provide infra-red illumination, which is transmitted through the cover 4 and illuminates the space in front of the device. Infra-red radiation from the space in front of the device enters the device 1 through the cover 4, and is detected by the CCD camera 3. The video output signal from the camera may be transmitted along a cable connected to the communications port 9.

[0028] The input aperture 5 of the camera 3 is substantially in contact with the cover 4. This prevents radiation from the LEDs reflecting off the cover and immediately onto the input aperture 5 of the detector. This prevents the images recorded by the camera being degraded by reflected radiation.

[0029] The number of LEDs 11 in the device 1 is may be varied, and depends on the size and shape of the space available for the array. The greater the illumination required, the larger the array of LEDs required.

[0030] Material for the cover 4 may be obtained from ICI.

[0031] The device 1 is particularly suitable for covert surveillance. The internal parts of the device are not visible to humans through the cover 4 because the cover is substantially opaque to visible radiation.

[0032] A second device 20 is shown in Fig. 3. This is a different shape to the first device 1, circular instead of rectangular. The second device 20 comprises illumination means (not shown), a detector (not shown) and a cover 24. The illumination means and the detector are enclosed within a casing 26. The internal arrangement of the second device 20 is very similar to the first device 1, with the exception that the number and shape of the array of LEDs will be different.

[0033] A number of other variations may be made to either the first device 1 or the second device 20. These include providing a radio transmitter in the device for transmitting the output video signal from the camera to a remote receiver. Also, a motorised mount could be provided instead of a bracket at the back of the device. This would allow the viewing angle of the device to be varied more readily.

[0034] As an alternative to infra-red radiation, radiation of any other suitable non-visible wavelength may be used, with appropriate modifications to the illumination means 2 and detector 3. The cover should be substantially opaque to visible light, but may be transparent to all other wavelengths.

[0035] In another embodiment, the surveillance device may have two modes of operation: a day mode and a night mode. Here, the cover 4 is a neutral grey filter. The cover 4 is tinted so that the apparatus 2, 3, 5, 11 behind the cover is obscured. The neutral grey cover will transmit substantially all wavelengths, including wavelengths visible to the human eye, but the surveillance device remains covert because the cover is tinted. During the day mode the camera is sensitive to visible light, and produces a colour image. During the night mode infra-red LEDs 11 are illuminated and the camera is sensitive to infra-red light, and produces an appropriate image.

[0036] A light source will now be described with reference to Figs 4, 5 and 6.

[0037] The tube of Figure 4 comprises an aluminium extrusion 31 having a generally cylindrical exterior surface 32 and formed with a slot at the top. A transparent window 33 is secured within the slot, the extrusion being provided with a lip 34 either side of the slot to support the edges of the window. The exterior surface of the tube is smooth at the sides 35 but is formed with a plurality of axially extending ridges 36 at the bottom.

[0038] Extending inwards from the sidewalls of the tube are a pair of axially extending lugs 41, forming between them a recess 42 on each side of the tube. The recesses face each other to receive a circuit board 51 along the centre of which is mounted a plurality of lamps 43. The circuit board is shown in greater detail in Figure 5 and contains a positive bar 52 and a negative bar 53, one on either side of the line of lamps 43. A connection 54 is made from the negative bar at one end through the lamps and a resistor 55 in series to the other end of 56 of the positive bar. The circuit board can be connected by means not shown to electrical connectors at each end of the tube so that adjacent tubes can be connected together electrically to connect the lamps of one tube in parallel with the lamps of another tube across their positive and negative bars. The electrical connectors are preferably arranged as slip rings in order to allow realtive movement of adjacent tubes about their common axis. The circuit board 51 is supported between the lugs 41 so that the lamps 43 are located immediately below the transparent window 33 so that on energization the lamps transmit radiation through the window.

[0039] The mounting clip 61 illustrated in Figure 6 has resilient side arms 62 to engage the sidewalls 35 of the tube and a tooth 63 between the arms to engage a recess between adjacent ridges 36 on the bottom of the tube. By selecting the relative position of the tooth 63 and the recess on the bottom of the tube, the azimuth of the tube 31 relative to the mounting clip 61 can be adjusted so that light is transmitted in the required direction. Insertion of the tube into the clip is facilitated by turning the tube so that the window extends approximately at right angles to the mouth of the clip since in this position the dimension of the tube parallel to the mouth of the clip is at a minimum since the window is plane and the rest of the tube is cylindrical. Insertion of the tube in this orientation into the clip means that the arms 62 of the clip have to be prised apart by a minimum

amount to receive the tube. Once the tube has been inserted between the arms of the clip, the tube can be turned to the desired orientation and held in that desired orientation by engagement of the tooth between adjacent ridges 16 on the bottom of the tube and the resilience of the side arms 62.

Claims

1. A device for surveillance, including a cover, illumination means for emitting electromagnetic radiation through the cover, and a detector for detecting radiation through the cover, the cover obscuring said illumination means and said detector to the human eye.

2. A device for surveillance, including illumination means, a detector and a cover, wherein electromagnetic radiation emitted by the illumination means leaves the device through the cover, and wherein electromagnetic radiation of the same wavelength enters the device through the cover and is detected by the detector, the cover obscuring said illumination means and said detector to the human eye.

3. A device according to claim 1 or 2, wherein the cover is substantially opaque to radiation visible to human eye.

4. A device according to claim 1 ,2 or 3, wherein the radiation receiving part of the detector is adjacent the cover.

5. A device according to claim 1, 2, 3 or 4, wherein the illumination means emits infra-red radiation.

6. A device according to any preceding claim, wherein the illumination means comprises at least one LED.

7. A device according to any preceding claim, wherein the detector comprises a CCD camera.

8. A light source including a tube having a transparent wall, and a light source holder supported within the tube to locate a light source held thereon behind the transparent wall, the tube being formed with guide means to support the holder and to allow the holder to be moved axially of the tube.

9. A light source according to claim 8, wherein the tube includes an opaque generally cylindrical portion formed with an axially extending slot, said transparent wall being mounted across said slot.

10. A light source according to claim 8 or 9, wherein said guide means comprises two opposite axially extending recesses to receive said holder.

11. A light source according to claim 8, 9 or 10, wherein the holder comprises a circuit board on which one or more lamps are mounted.

12. A light source assembly including a light source as claimed in any one of claims 8 to 11, and a mounting for the tube of the light source.

13. A light source assembly according to claim 12, wherein said tube is adjustably mounted in said mounting for relative movement about the tube axis.

14. A light source assembly according to claim 12 or 13, wherein said tube comprises a ridged outer region, the ridges extending axially of the tube, and the mounting preferably comprises means for engaging said ridges.

15. A light source assembly according to claim 12, 13 or 14, wherein said mounting comprises means for partially encircling said tube.

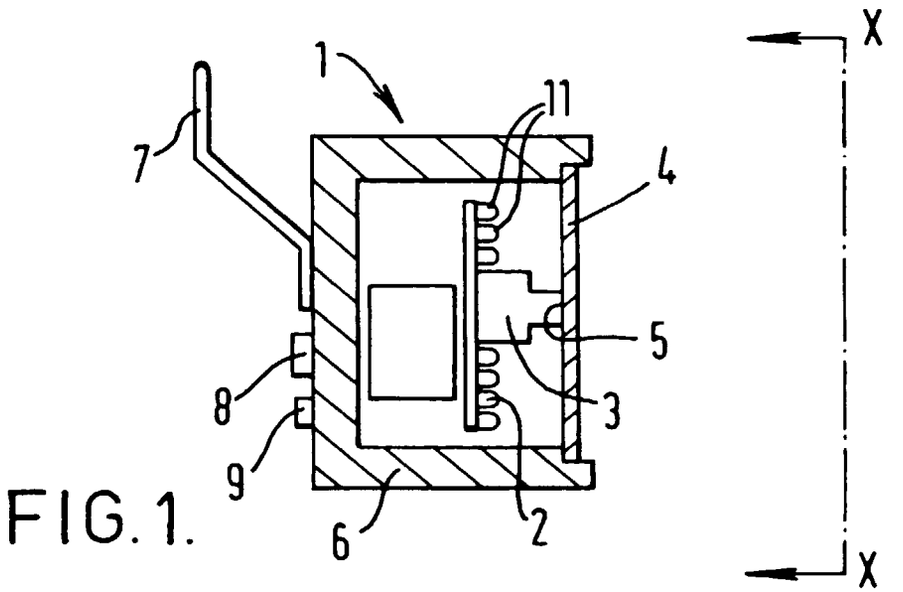

FIG. 1.

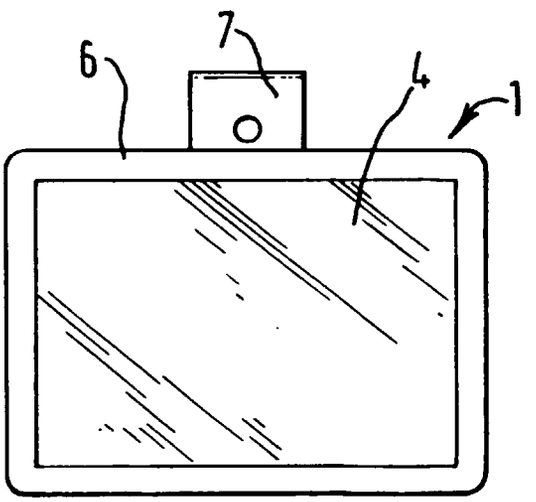

FIG. 2.

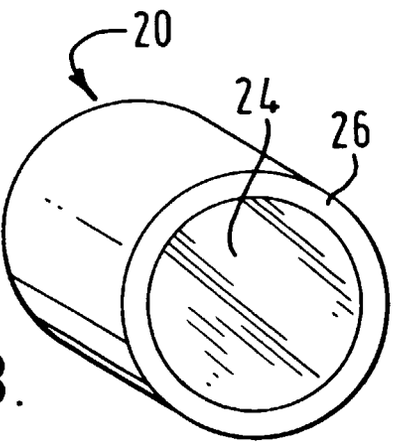

FIG. 3.

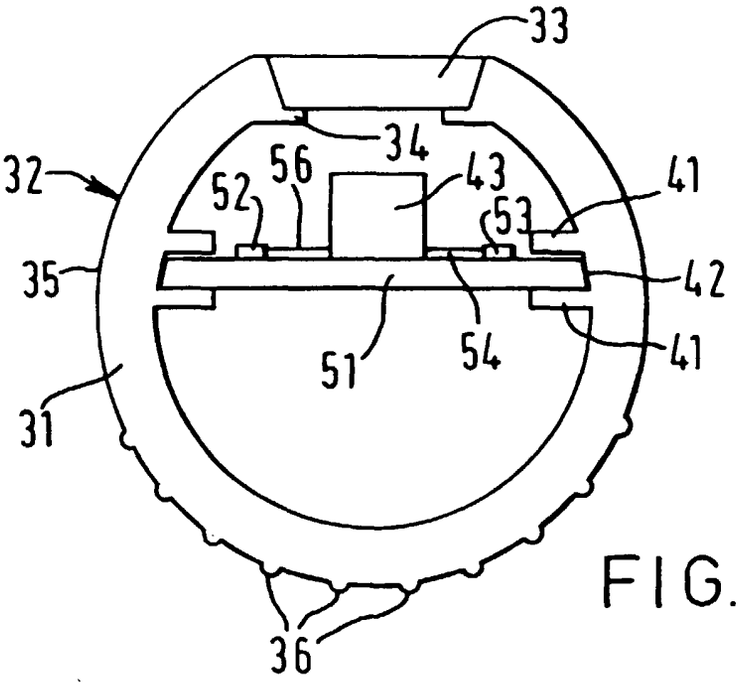

FIG. 4.

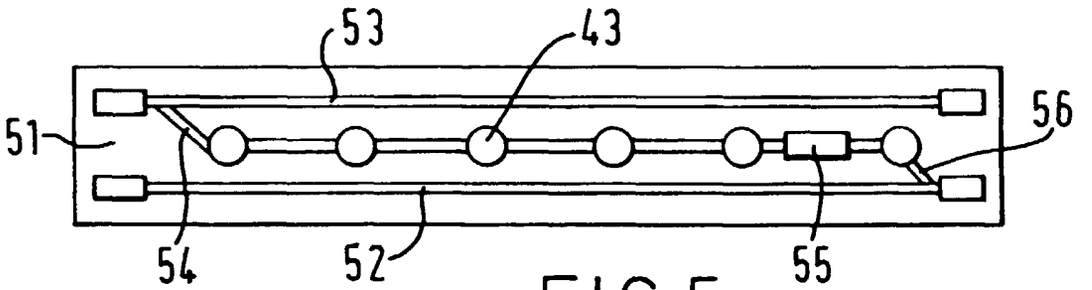

FIG. 5.

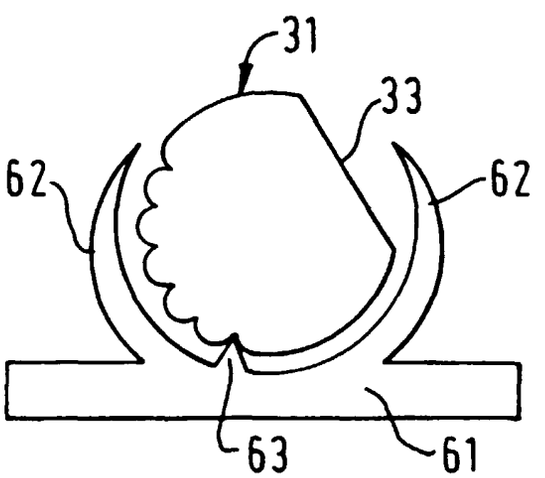

FIG. 6.

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EUROPEAN SEARCH REPORT

Application Number
EP 00 30 4883

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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			G08B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 September 2000	Sgura, S

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