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(54) LIGHTING DEVICE COMPRISING A PLURALITY OF LIGHT CONDUCTING FIBRES

(71) I, WOLFGANG HOCHMUTH trading as the firm CIMA INTERNATIONAL Dipl. Kfm. W. Hochmuth, Bussardstrasse 19, 851 Fuerth Bayern, Germany; a German national, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention concerns a lighting device comprising a plurality of light conducting fibres which are held together at one end in a bunch which is connected to a light fitting housing containing a light source and a rotatable colour changing disc, the point of connection being above the light source and the disc and the fibres being freely spread out at their free ends.

In the case of known light fittings of this type, the light conducting fibres form points of light at their free ends, when their bunched ends are illuminated by the light source, said points of light being changed in colour by the turning of the colour changing disc. The light source is a halogen lamp, the radiation of which reaches the light conducting filaments through a heat-proof filter, whilst a current of air from a fan operating in the light fitting housing keeps the working temperature at a reasonable value.

It is an object of the present invention to increase the luminous effect of the light fitting whilst simultaneously simplifying the structural design.

In accordance with the present invention there is provided a lighting device comprising a plurality of light-conducting fibres which are held together at one end in a bunch which is connected to a light fitting housing containing a light source and a rotatable disc having differently coloured transparent sectors, the point of connection being above the light source and the disc and the fibres being freely spread out at their free ends, in which the light fitting housing is provided with a plurality of apertures in a plurality of different planes above the light source to allow

for a flow of cooling air through the housing and so that rays of coloured light from the light source may shine through the apertures and impinge on the peripheral surfaces of the light-conducting fibres intermediate the ends of the fibres. 50

The housing of the light fitting is preferably provided with apertures below as well as above the light source for the formation of a convected flow of cooling air. 55

In one embodiment of the lighting device the rays of coloured light passing through the apertures may pass first through the colour changing disc provided for the irradiation of the light conducting fibres, said disc comprising different coloured transparent sectors and being driven at a low speed of rotation by means of a reduction gear by an electric motor. It is also possible, however, to produce the coloured rays of light by means of an independent colour changing device. 60

According to a preferred embodiment the colour changing disc and the driving device for said disc are secured, together with the light source, on a common support in the light fitting housing. As a support a plate may be used which is rigidly connected to the light fitting housing and has apertures formed therein for the free circulation of air in the housing. 65

The lighting effect may also be varied by replacing the bunch of light conducting fibres which is detachably located in a bush on the light fitting housing with another and different bunch of light conducting fibres having a smaller diameter which can be secured to the housing by means of an adapter supported in the bush. The interchangeability of the light conducting fibres is advantageous in the work of assembly or repair or in the transport of the light fitting. 70

In a preferred embodiment the light fitting housing is formed by halves of a hollow sphere which are firmly or detachably connected together and are erected firmly on a pedestal. A special effect may be achieved by rotatably supporting the spherical housing on the pedestal, said housing being slowly 75

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rotated by means of an electric motor by way of a gear system. In the case of light fittings having a low voltage lamp as the light source, the pedestal may be used for accommodating the necessary voltage transformer, whilst the free space remaining in the pedestal may be filled with a cast resin for improving the insulating properties. It has been found that the spherical design of the housing has a favourable effect on the formation and stabilising of the convected flow of cooling air.

The present invention will be described further, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 shows a side view of a lighting device, partly in section;

Fig. 2 shows a plan view of the lighting device;

Fig. 3 shows a plan view of part of the lighting device.;

Fig. 4 shows a side view of a colour changing disc with drive means;

Fig. 5 shows a part of a light fitting housing comprising a bunch of light conducting fibres; and

Fig. 6 shows another partial section through a light fitting housing comprising a bunch of light conducting fibres.

A light fitting housing 1 is formed by halves 2 and 3 of a hollow sphere which are firmly or detachably connected together. A rabbet 4 provided in the plane of separation of the two halves of the hollow sphere serves to align the halves. Mounted on the housing 1 in a bush 5 is a bunch 6 of light conducting glass fibres, the free ends 6' of which are freely spread out. Associated with the bunch of fibres 6, as a light source, are a halogen lamp 7, a reflector 8 and a heat-proof filter 9 so that by illuminating the bunched ends of the fibres 6 points of light 10 are formed at the free ends 6' of the fibres 6. A disc 11 is associated with the light source 7, which disc is formed of differently coloured transparent sectors 11' and clamping discs 11''. The disc 11, as shown in Fig. 4, is rotatable by means of a wormgear 13, a worm 14, another wormgear 15 and a worm 16 which is then driven by an electric motor 12.

The colour of the points of light 10 varies according to the sector 11' disposed above the light source. The halogen lamp 7, the reflector 8 and the heat-proof filter 9 are supported by a plate 17 firmly connected to the half 3 of the hollow sphere, together with the colour changing disc 11, the reduction gear 13, 14, 15, 16 and the electric motor 12.

The two halves 2 and 3 of the hollow sphere, as shown in Figs. 1 and 2, are provided with a plurality of apertures 18 to allow a flow of cooling air. Furthermore, openings 19 are formed in the plate 17 so that the cooling air can flow by convection in the light fitting housing 1 and pass through the housing 1 in the direction of the arrows *a* and *b* for

the discharge of the heat produced by the light source, without using a fan. Light rays 20 from the colour changing disc 11 simultaneously pass through the apertures 18 in the half 2 of the hollow sphere and produce an annular or segment-like colour effect by impinging on the peripheral surfaces of the light conducting fibres (Fig. 2) as an additional luminous effect. This effect is increased by the rotation of the coloured disc and the resultant changes of colour. In addition to the points of light 10, a colour effect perceptible within the bunch of fibres is produced on said bunch.

In accordance with the present invention, modifications of the colour effect are possible by the provision of apertures 18 of different sizes or shapes. The housing 1 is erected on a pot-shaped pedestal 22 accommodating transformer 23 for the halogen lamp 7. The free space between the transformer 23 and the inner surfaces of the pedestal 22 is filled with a cast resin 24, a feature which has a favourable effect on the insulated accommodation of the transformer.

As shown in Fig. 5, the bunch of light conducting fibres 6 is firmly enclosed in a sleeve 25 for forming them into a bunch at the housing end and the sleeve 25 is detachably held in the bush 5. The bunch of light conducting fibres 6 can be removed from the housing 1 by extracting them from the bush 5 and, if desired, replacing them with another bunch of light conducting fibres.

In Fig. 6 an adapter 26 is inserted in the bush 5 and receives a bunch of light conducting fibres 6 having a smaller diameter and holds them in the housing 1. Again, the bunch of filaments 6, shown in Fig. 6, is enclosed at the bunched end by a sleeve 25. It is in accordance with the present invention that the bunch of fibres 6 can be securely connected to the light fitting housing 1.

WHAT WE CLAIM IS:—

1. A lighting device comprising a plurality of light-conducting fibres which are held together at one end in a bunch which is connected to a light fitting housing containing a light source and a rotatable disc having differently coloured transparent sectors, and the point of connection being above the light source and the disc and the fibres being freely spread out at their free ends, in which the light fitting housing is provided with a plurality of apertures in a plurality of different planes above the light source to allow for a flow of cooling air through the housing and so that rays of coloured light from the light source may shine through the apertures and impinge on the peripheral surfaces of the light-conducting fibres intermediate the ends of the fibres.

2. A lighting device as claimed in claim 1, in which the light fitting housing has aper-

- tures below and above the light source to allow for a convected flow of cooling air.
3. A lighting device as claimed in claims 1 or 2, in which the rays of coloured light passing through the apertures pass first through the colour changing disc or are obtained from an independent colour changing device. 5
4. A lighting device as claimed in any preceding claim, in which the colour changing disc is rotatable by an electric motor by means of a reduction gear which are all mounted, together with the light source, on a support in the housing. 10
5. A lighting device as claimed in claim 4, in which the support is formed by a plate which is firmly connected to the housing and has apertures therein to allow for the flow of cooling air. 15
6. A lighting device as claimed in any preceding claim, in which the bunch of light conducting fibres is detachably located in a bush on the housing and is interchangeable with a bunch of light conducting fibres having a smaller diameter which can be secured to the housing by means of an adaptor supported in the bush. 25
7. A lighting device as claimed in any preceding claim in which the housing is formed by halves of a hollow sphere securely or detachably connected together and firmly mounted on a pedestal. 30
8. A lighting device as claimed in any of claims 1 to 6, in which the light fitting housing is rotatably mounted on a pedestal and is driven at a low speed of rotation by an electric motor by way of a gear system. 35
9. A lighting device as claimed in claim 7 or 8, having a low voltage lamp, in which the low voltage lamp is a halogen lamp connected to a transformer accommodated in the pedestal. 40
10. A lighting device as claimed in claim 9, in which the transformer is enclosed in the pedestal by a cast resin. 40
11. A lighting device substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings. 45

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