

Description

This invention relates to festoon lighting of the kind (hereinafter termed of the kind referred to) comprising a length of electric cable incorporating at least two cores and a plurality of lampholder fittings connected with the cable at spaced intervals therealong. Such lighting is disclosed in EP-A-0 250 215.

One form of festoon lighting comprises a chasing (or running) light system as seen for example at seaside resorts and in fairgrounds, but also generally, for example, at Christmas time, and other local or national festivities, cinemas, theatres and the like. It comprises festoon lighting whose lamps are switched on and off in special sequence to give the impression that light is running or chasing along the cable.

Conventionally the lampholders have been moulded onto the cable. This operation is both time-consuming and costly.

Also known are lampholders comprising parts which lock together by application of axial pressure to cause pins to penetrate the cores of a cable located between the parts. These lampholders have an important disadvantage compared with the ones moulded onto the cable in that they can, after assembly, be dismantled thereby failing to meet the electrical safety regulations of some countries.

It is an object of the present invention to provide a lampholder of this latter kind which once assembled is incapable of being dismantled.

According to the present invention there is provided festoon lighting of the kind referred to whose lampholder fittings comprise a lampholder base including a cylindrical shroud extending from a channel in which a cable may be laid, pins projecting into said channel and a cap having a plurality of angularly spaced depending lugs each with a radially directed tooth on its free end, the cap and base being interengageable by axial pressure to cause the pins to penetrate the cores of a cable laid in said channel and to force the lugs through apertures in a part integral with said shroud whereby the teeth engage with shoulders on the underside of said apertures, the lugs being a close fit within the apertures such that passage of the teeth through the apertures involve elastic deformation of the parts.

There may be four lugs.

The channel may be separable from the lampholder base to give access to space within the base to house a miniature circuit assembly.

The invention will be further apparent from the following description with reference to the several figures of the accompanying drawings, which show, by way of example only, one form of festoon lighting embodying same.

Of the drawings :-

Figure 1 shows a length of festoon lighting;

Figure 2 is an exploded perspective view of a lampholder;

Figure 3 is a partially sectioned side elevation of the lampholder of Figure 2; and

Figure 4 is a circuit diagram of a timer.

As seen in Figure 1, the festoon lighting comprises a length of cable 10 having spaced lampholders therealong equipped with lights 12.

As shown in Figures 2 and 3 each lampholder comprises a base 30 including a cylindrical shroud 31 extending from a channel 32 in which a cable may be laid. Pins 33 project into the channel.

In a modification, and for a purpose which will be apparent hereinafter, the channel 32 and pins 33 may be separate from the remainder of the base.

The lampholder further comprises a cap 34 having four equi-angularly spaced depending lugs 35, each of which has an outwardly radially directed tooth 36 on its free end. The cap 34 and base 30 are interengageable by axial pressure to cause the pins 33 to penetrate the cores of a cable laid in the channel 32 between the cap and base and to force the lugs 35 through apertures 37 in an annular flange 38 integral with the shroud 31. The flange 38 presents an upwardly directed annular recess 39 which receives the rim of the cap 34. After assembly the teeth 36 engage with the shoulders 40 on the underside of the apertures 37. The lugs 35 are a close fit within the apertures 37 such that passage of the teeth 36 through the apertures 37 involves elastic deformation of the parts, whereby after assembly subsequent dismantling is not ordinarily possible.

The cable which is compressed between the cap and base exits the assembly through glands 41 formed by the cap and base.

As previously mentioned the channel 32 may be separable from the base to give access to a space within the lampholder to house a timer circuit.

In this way a chasing light system comprising individual timers 11, of which one is illustrated in Figure 4, for each light 12 of the system, triggered by a common triggering signal to switch the lamps 12 at different times within an operating cycle, may be provided.

Figure 1 shows a string of lights 12 on a cable 10 and identifies a complete section of eight lights 12(1),

12(2), ..., 12(8) which have timers 11(1), 11(2), ..., 11(8) arranged to switch their associated lamps on at successive say quarter-second intervals during a cycle time of say two seconds. Of course different cycle times may be used to give the effect of faster or slower running waves of light along the string. The timers 11 also switch the lights off in the same sequence. If the lamps are switched off a quarter second after they are switched on, the effect will be that of a single light moving along the string. If they are switched off one and one half or one and three quarter seconds after they are switched on, the effect will be that of a dark patch moving along the lit string.

The triggering signal effectively comes from switching power to the string which sets off all the timers 11 simultaneously. Synchronism is maintained by the timers being controlled according to the frequency of an a.c. energising current.

Figure 4 illustrates a circuit for the timers 11 comprising an addressable latch 21 controlling a solid state switch - silicon-controlled rectifier SCR1 - and switched by a counter 22 run from pulses derived from the a.c. mains supply at inputs AC+, AC-.

The input a.c. is rectified in a full wave rectifier 23. It is important to rectify the input a.c. in a festoon light system in which the live and neutral wires are tapped using pins which penetrate the cable insulation, and so it will not necessarily be known which pin contacts the live and which the neutral wire.

A pulsed control signal chopped from the a.c. input by zener diode ZD1 is used to control the counter 22 which inputs mains-synchronised control signals to the latch 21 to cause output signals to appear at different times at its outputs 00, ..., 07. Which of these outputs is connected by a link option to the gate G of SCR1 determines at which point in the cycle SCR1 is rendered conductive to close the circuit on rectified AC outputs ACR-, ACR+ to which the lamp is connected.

Further link options between the counter 22 and the latch 21 can be used to energise the outputs at different times in four or sixteen, say, interval cycles.

Resetting the latch 21 is effected by a pulse when zener diode ZD2 discharges a capacitance C2.

Claims

1. Festoon lighting comprising a length of electric cable (10) incorporating at least two cores and a plurality of lampholder fittings connected with the cable at spaced intervals therealong, whose lampholder fittings comprise a lampholder base (30) including a cylindrical shroud (31) extending from a channel (32) in which a cable may be laid, pins (33) projecting into said channel and a cap (34) having a plurality of angularly spaced depending lugs (35) each with a radially directed tooth (36) on its free end, the cap (34) and base (30) being interengageable by axial pressure to cause the pins (31) to penetrate the cores of a cable laid in said channel and to force the lugs through apertures (37) in a part integral with said shroud (31) whereby the teeth (36) engage with shoulders on the underside of said apertures, the lugs being a close fit within the apertures such that passage of the teeth through the apertures involves elastic deformation of the parts.
2. Festoon lighting according to claim 1, wherein there are four lugs (35).
3. Festoon lighting according to claim 1 or claim 2, wherein the channel is separable from the lampholder base to give access to space within the base (30) to house a miniature circuit assembly.
4. Festoon lighting according to claim 3, and being a chasing light system comprising individual timers (11) for each lamp of the system triggered by a common triggering signal to switch the lamps at different times within an operating cycle, the individual timers being housed within the lampholder fittings.
5. Festoon lighting according to claim 4, powered from an a.c. supply used to provide the triggering signal, and to synchronise the timing circuits.
6. Festoon lighting according to claim 4 or claim 5, comprising a single supply cable with the lamps (12) distributed therealong in sections, each section comprising a number of timers (11), each operating at a different phase of switching, to constitute a complete switching cycle.
7. Festoon lighting according to claim 6, in which the lamps (12) in each section are arranged with consecutive switching phases.
8. Festoon lighting according to any one of claims 4-7, each timer comprising an addressable latch controlling



12(2), 12(8) which have timers 11(1), 11(2), 11(8) arranged to switch their associated lamps on at successive say quarter-second intervals during a cycle time of say two seconds. Of course different cycle times may be used to give the effect of faster or slower running waves of light along the string. The timers 11 also switch the lights off in the same sequence. If the lamps are switched off a quarter second after they are switched on, the effect will be that of a single light moving along the string. If they are switched off one and one half or one and three quarter seconds after they are switched on, the effect will be that of a dark patch moving along the lit string.

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2. Festoon lighting according to claim 1, wherein there are four lugs (35).
3. Festoon lighting according to claim 1 or claim 2, wherein the channel is separable from the lampholder base to give access to space within the base (30) to house a miniature circuit assembly.
4. Festoon lighting according to claim 3, and being a chasing light system comprising individual timers (11) for each lamp of the system triggered by a common triggering signal to switch the lamps at different times within an operating cycle, the individual timers being housed within the lampholder fittings.
5. Festoon lighting according to claim 4, powered from an a.c. supply used to provide the triggering signal, and to synchronise the timing circuits.
6. Festoon lighting according to claim 4 or claim 5, comprising a single supply cable with the lamps (12) distributed therealong in sections, each section comprising a number of timers (11), each operating at a different phase of switching, to constitute a complete switching cycle.
7. Festoon lighting according to claim 6, in which the lamps (12) in each section are arranged with consecutive switching phases.
8. Festoon lighting according to any one of claims 4-7, each timer comprising an addressable latch controlling



a solid state switch and switched by a counter run from pulses derived from an a.c. supply.

9. Festoon lighting according to claim 8, comprising reset means for the latch adapted to reset the latch in a time less than the cycle time.
10. Festoon lighting according to claim 8 or claim 9, in which the timers are set to different switching phases by connecting different outputs of the addressable latch to the solid state switch.

Patentansprüche

1. Girlandenleuchte mit einem Stück elektrischem Kabel (10), das wenigstens zwei Adern hat, und einer Vielzahl von Fassungsgarnituren, die mit dem Kabel in gegenseitigen Abständen längs desselben verbunden sind, wobei die Fassungsgarnituren einen Fassungssockel (30) mit einem zylindrischen Mantel (31), der sich von einem Kanal (32) aus erstreckt, in welchen ein Kabel eingelegt werden kann, Stifte (33), die in den Kanal vorstehen und eine Kappe (34) aufweisen, die mehrere gegenseitigen Winkelabstand aufweisende, nach unten vorstehende Ansätze (35) hat, von denen jeder einen radial gerichteten Zahn (36) an seinem freien Ende aufweist, wobei die Kappe (34) und der Sockel (30) durch axialen Druck in gegenseitigen Eingriff bringbar sind, um die Stifte (31) zu veranlassen, die Adern eines in den Kanal eingelegten Kabels zu durchdringen, und die Ansätze durch Öffnungen (37) in einem Teil zu drücken, das integraler Bestandteil des Mantels (31) ist, wodurch die Zähne (36) Schaltern an der Unterseite der Öffnungen erfassen und die Ansätze eine enge Passung in den Öffnungen haben, so daß das Hindurchführen der Zähne durch die Öffnungen eine elastische Verformung der Teile beinhaltet.
2. Girlandenleuchte nach Anspruch 1, wobei vier Ansätze (35) vorhanden sind.
3. Girlandenleuchte nach Anspruch 1 oder Anspruch 2, wobei der Kanal von dem Fassungssockel trennbar ist, um einen Raum innerhalb des Sockels (30) zum Aufnehmen einer Miniaturschaltungsbaugruppe zugänglich zu machen.
4. Girlandenleuchte nach Anspruch 3, die als ein Lauflichtsystem ausgebildet ist, mit individuellen Zeitgebern (11) für jede Lampe des Systems, die durch ein gemeinsames Triggersignal getriggert werden, um die Lampen zu unterschiedlichen Zeiten innerhalb eines Betriebszyklus zu schalten, wobei die individuellen Zeitgeber in den Fassungsgarnituren untergebracht sind.
5. Girlandenleuchte nach Anspruch 4, gespeist aus einer Wechselstromquelle, die benutzt wird, um das Triggersignal zu liefern und die Zeitgeberschaltungen zu synchronisieren.
6. Girlandenleuchte nach Anspruch 4 oder Anspruch 5, mit einem einzelnen Versorgungskabel, wobei die Lampen (12) in Abschnitten längs desselben verteilt sind und wobei jeder Abschnitt eine Anzahl von Zeitgebern (11) aufweist, die mit einer unterschiedlichen Schaltphase arbeiten, um einen vollständigen Schaltzyklus zu bilden.
7. Girlandenleuchte nach Anspruch 6, bei der die Lampen (12) in jedem Abschnitt mit aufeinanderfolgenden Schaltphasen angeordnet sind.
8. Girlandenleuchte nach einem der Ansprüche 4-7, wobei jeder Zeitgeber einen adressierbaren Zwischenspeicher aufweist, der einen Festkörperschalter steuert und durch einen Zähler geschaltet wird, welcher mit Impulsen aus einer Wechselstromversorgung betrieben wird.
9. Girlandenleuchte nach Anspruch 8, mit einer Rücksetzeinrichtung für den Zwischenspeicher, die in der Lage ist, den Zwischenspeicher in einer Zeit rückzusetzen, die kürzer als die Zykluszeit ist.
10. Girlandenleuchte nach Anspruch 8 oder Anspruch 9, bei der die Zeitgeber auf unterschiedliche Schaltphasen eingestellt werden, indem unterschiedliche Ausgänge des adressierbaren Zwischenspeicher mit dem Festkörperschalter verbunden werden.

**Revendications**

- 5 1. Guirlande lumineuse comprenant une section ou longueur de câble électrique (10) dans laquelle sont incorporés, au moins, deux conducteurs et une pluralité de douilles, reliées au câble le long de celui-ci, à intervalles espacés, dans lequel les douilles comprennent un socle de douille (30) pourvu d'un capot cylindrique (31) s'étendant à partir d'un canal formant conduit (32), dans lequel un câble peut être posé, des broches (33) en saillie dans ledit conduit et un couvercle (34) comprenant une pluralité de pattes pendantes ou dirigées vers le bas, espacées angulairement (35), chacune d'elles pourvue d'une dent (36) dirigée radialement sur son extrémité libre, le couvercle (34) et le socle (30) pouvant être engagés mutuellement en prise par une pression axiale de manière à provoquer la pénétration des broches (31) dans les conducteurs d'un câble posé dans ledit conduit et enfoncer par force les pattes à travers les ouvertures (37) dans une partie incorporée monobloc audit capot (31), de manière que les dents (36) viennent s'engager en prise sur les épaulements de la face inférieure desdites ouvertures, les pattes étant à ajustage serré dans les ouvertures, de manière que le passage des dents à travers les ouvertures provoque une déformation élastique des pièces.
- 10 2. Guirlande lumineuse selon la revendication 1, dans laquelle il est prévu quatre pattes (35).
3. Guirlande lumineuse selon la revendication 1 ou 2, dans laquelle le conduit peut être séparé du socle de la douille pour donner accès à l'espace ménagé dans le socle (30) pour loger un ensemble de circuit miniaturisé.
- 20 4. Guirlande lumineuse selon la revendication 3 et constituant un système d'éclairage courant ou à défilement comprenant des minuteriers individuelles (11) pour chaque ampoule du système, déclenchées par un signal de déclenchement commun, pour commuter les ampoules à des moments différents pendant le cycle de fonctionnement, les minuteriers individuelles étant logées dans les douilles.
- 25 5. Guirlande lumineuse selon la revendication 4, commandée par un courant alternatif d'alimentation utilisé pour émettre le signal de déclenchement et pour synchroniser les circuits de minuterie.
- 30 6. Guirlande lumineuse selon la revendication 4 ou 5, comprenant un câble d'alimentation unique pourvu d'ampoules (12) réparties par sections sur ledit câble, chaque section comprenant une pluralité de minuteriers (11), chacune d'elles fonctionnant à une étape différente de la commutation, de manière à constituer un cycle de commutation complet.
- 35 7. Guirlande lumineuse selon la revendication 6, dans laquelle les ampoules (12) de chaque section sont disposées par phases de commutation consécutives.
8. Guirlande lumineuse selon l'une quelconque des revendications 4 à 7, chaque minuterie comprenant un registre de verrouillage commandant un interrupteur à semi-conducteurs et commuté par un compteur à partir d'impulsions dérivées d'une alimentation à courant alternatif.
- 40 9. Guirlande lumineuse selon la revendication 8, comprenant des moyens de remise à zéro du registre de verrouillage, agencés pour remettre le registre de verrouillage à zéro en un temps inférieur à la durée du cycle.
- 45 10. Guirlande lumineuse selon la revendication 8 ou 9, dans laquelle les minuteriers sont réglées à différents étapes de commutation en connectant différentes sorties du registre de verrouillage à l'interrupteur à semi-conducteurs.

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