



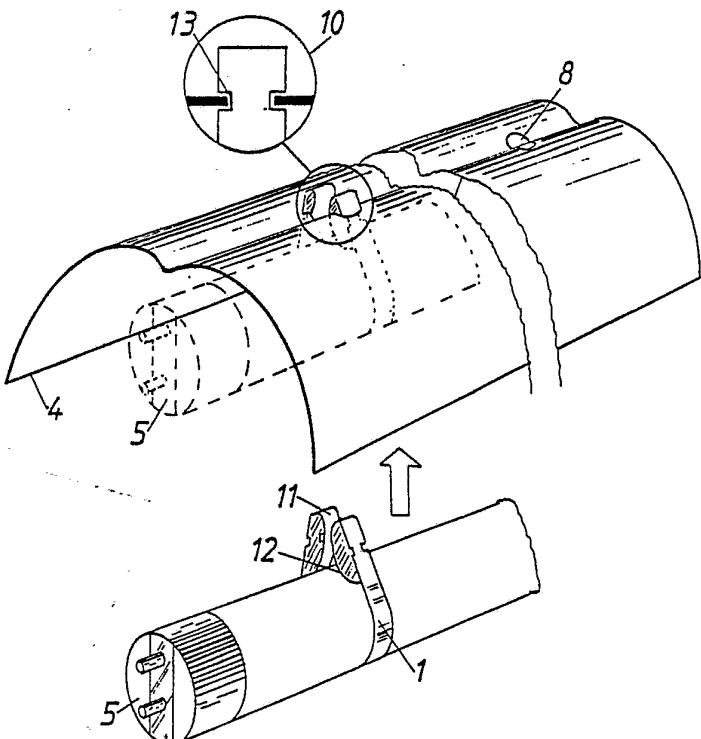
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(54) Title: REFLECTOR SYSTEM FOR SECURING TO A LIGHT SOURCE

(57) Abstract

When it is desired to increase the light yield from fluorescent tube installations without reflectors by providing the fluorescent tubes with a reflector, it is often difficult to mount and position the reflector in an existing light fitting, and it is even more difficult when such fluorescent tubes sit freely on a wall or a ceiling, or are mounted externally on a fitting. For this purpose the reflector system comprises a reflector (4) of anodized aluminum and securing elements (1) consisting of spring straps which surround the fluorescent tube (5) and secure the reflector (4) to the fluorescent tube by means of friction between the securing element's strap (1) and the fluorescent tube (5). Also provided is a second embodiment of the securing element which is intended for fittings with a flat surface. In this case the securing element has some protruding ends which bear against the flat surface of the fitting and thus position and secure the reflector in the correct position.



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REFLECTOR SYSTEM FOR SECURING TO A LIGHT SOURCE

This invention relates to a reflector system for securing to a light source as presented in the introduction of claim 1.

Reflectors for lighting purposes are most often manufactured of anodized aluminium plate and are secured to the light fitting, in that the reflectors are normally produced especially for use in connection with the individual types of fittings.

However, many light sources are to be found, for example fluorescent tubes, which are mounted in fittings without reflectors or which are disposed freely outside the fitting. When for reasons of increasing energy prices it is desired to increase the illumination without exchanging the lamps for lamps having a greater energy consumption, one can provide them with suitable light reflectors. In order to make the assembly independent of the shape of the fitting, it is most expedient for the reflector to be mounted directly on the light source.

Reflectors for mounting directly on to fluorescent tubes are known, for example executed in plastic materials and provided with various means of reflection. It is, however, more expedient to produce the reflector of anodized pure aluminium, the reason being that this material is more robust and stable in shape and, furthermore, its reflecting characteristics are more durable.

In the following, the invention is explained in con-



nnection with the use of an elongated light source, and a normal fluorescent tube has been chosen as an example.

5 The actual cross-sectional curve of the reflector, which does not form a direct part of the present invention, conforms mainly to that shape known, for example, from British patent no. 884,068, the lower part of the reflector cross-sectional curve turning 10 downwards to form a light output aperture which strongly reduces the light intensity immediately outside an angle which is desired to limit the transmission of light transversely to the fitting. The shape of this part of the reflector cross section is known from 15 textbooks and from pending Danish patent application no. 5775/76.

However, between these two parts of the reflector cross section there is inserted a straight part, or 20 an approximately straight part, from that point on the involute curve to the light source cross section in the same plane, from which a half-tangent to the light source is parallel - for symmetrical reflectors - to the plane of symmetry.

25 This straight part in the reflector cross section continues so far that the light intensity in directions near the reflector's plane of symmetry is so much less than the intensity of light at greater angles from the 30 plane of symmetry that the light transmission results in a focal point relationship which, according to the BZ system, is greater than 0.7 at $S/H_m = 1.5$.

Therefore, there is no real continuity in the trans-

ition between the types of curves used, and several of the remaining characteristics displayed in the shaping of the reflector according to Danish patent application no. 5775/76 do not apply to the reflector 5 as described here.

The reflector system according to the invention will, however, display optimum characteristics with regard to energy loss, outer dimensions and glare, and also 10 the improvement in the application possibilities which lies in the fact that it will provide good regularity in the illumination, even when the light fittings hang spread with $S/H_m = 1.5$.

15 This improvement is necessary for the reason that the regularity of the illumination must not be diminished in the mounting of reflectors on existing installations.

20 Reflectors of the above-mentioned shape are difficult to mount in existing fittings which do not already have reflectors, and on completely freely-disposed fluorescent tubes.

25 The object of the invention is to provide a reflector system consisting of a reflector of the correct shape, for example of anodized aluminium plate, which is cheap to produce, and also to provide securing elements which are similarly simple and thus also cheap 30 to produce. Moreover, with lighting installations, it is important that after having been fitted with reflectors that the installation maintains a reasonable aesthetic standard, and at the same time that the reflector system is simple and quick to mount.

This is achieved by forming the reflector system as characterized in claim 1.

If the light source is of the type which sits in a fitting, in certain cases one can utilize a flat surface in the fitting so that the reflector sits correctly in relation to the light source, and at the same time it will be correctly positioned in relation to the fitting and the direction of illumination.

10 This is effected in an expedient manner by designing the securing element for the reflector system as presented in claim 2.

If, however, the light source sits freely outside the fitting or externally on the fitting, or if the fitting does not have a reasonably flat surface of contact, the reflector system according to claim 3 can be used, in that here it is secured exclusively on the light source.

20 By designing the reflector system's securing element as presented in claim 4, it is possible to secure the reflector without the securing element actually clamping around the fluorescent tube, but instead being merely supported by the fluorescent tube.

On the other hand, if the reflector system's securing element is designed as presented in claim 5, the result is that the securing element clamps tightly around the fluorescent tube and, in this manner, tightly secures the reflector.

As presented in claims 6 and 7, the securing element is provided with gripper recesses, whereby a well-de-



fined friction is achieved between the strap of the securing element and the fluorescent tube it surrounds.

5 The invention will now be described with reference to the drawing, where

10 fig. 1 shows a reflector system according to the invention in an embodiment intended for securing directly on to a fluorescent tube,

15 fig. 2 shows a securing element for the reflector system shown in fig. 1,

20 fig. 3 shows a reflector system according to the invention in an embodiment intended for securing to a fluorescent tube mounted in a fitting, and

25 fig. 4 shows a securing element for the reflector system shown in fig. 3.

In sketch form in figs. 1 and 2 will be seen a reflector system intended for mounting directly on, for example, a fluorescent tube which sits freely mounted, for example on a wall or a ceiling, or externally on a fitting. One or more securing elements surround the fluorescent tube and are secured to the reflector 4 in assembly holes 8. The assembly hole 8, also called the gripping hole, is formed and positioned in the reflector's lengthwise central axis and is shown in detail in the segment drawing 10 in the circle above fig. 1 itself. The securing element 1 has gripping recesses



13 at the ends at which the securing element is bent, thus enabling it to be secured in the assembly hole 8 as shown in fig. 1. The securing element surrounds the fluorescent tube 5 with sufficient friction to secure 5 the reflector 4 in a certain position. This friction, however, is no greater than one can turn the reflector 4 if this has been placed in a slightly crooked manner on the light source. Together with that part of the securing element which surrounds the light source, it 10 is the bent ends 1a which at point 12 have flexible connection with the light source which provide the necessary friction. The bent ends of the securing element, see fig. 2, reach right in and support against that part of the securing element which lies as a tangent 15 to the fluorescent tube, see fig. 1.

In figs. 3 and 4 is shown a second embodiment of the invention, this embodiment being particularly suitable for mounting on fluorescent tubes which are placed in 20 a fitting with a flat surface, which in the drawing is represented by the stippled line in fig. 3. For the sake of clarity, in fig. 3 the reflector system is shown as seen directly from the one end of the fluorescent tube. Here, the reflector 4 is secured by a 25 securing element 2, see fig. 4, which surrounds the light source 5 and passes through a hole in the reflector. At point 6 the reflector is held firmly in the gripping recesses 13 in the securing element 2 which bears against the fitting 9 at points 7. The 30 securing element substantially surrounds the light source so that there is no friction against the light source, in that the reflector 4 will of course always sit in the correct position. When the ends 2a of the securing element 2 bear up against the fitting 9, they



are influenced in such a way that they slide slightly away from each other. The pressure with which the reflector 4 and the securing element 2 lie up against the fluorescent tube is determined by the moment 5 which arises due to the flexible contact of the quite long and springy ends against the fitting.

The reflectors 4 used in the embodiments shown in both fig. 1 and fig. 3 are the same, in that the holes provided in the reflector 4 are of such a shape that the gripping recess 13 in the securing element 1 or 2 engages in the holes 8. The securing elements as shown in figs. 2 and 4 are also essentially the same, their bent ends 1a and 2a merely being bent differently. The 10 length of the securing element naturally depends on the type of light source on which the reflector is to be mounted. The securing element is normally made of metal, for example thin metal plate of spring steel, but other flexible materials can also be used.

15
20 Although the invention has been explained and shown in connection with a fluorescent tube, it is obvious that the reflector system according to the invention can be used on other types of elongated light sources. 25 The reflector 4 can also be of other expedient shapes. It merely needs to be provided with suitable holes so that it can be secured by the gripping recesses 13 in the securing elements.

30



C L A I M S

1. Reflector system for securing to an elongated light source (5), for example a fluorescent tube, comprising a reflecting metal reflector (4) which is mounted above the light source (5) and secured directly to said light source by means of one or more securing elements (1, 2), each of which consists of a narrow, flexible metal strap with an essentially circular part arranged to partly surround the light source (5), characterized in that both ends (1a, 2a) of the circular part are provided with a holding element for securing the reflector (4) which is provided with a hole (8) for each securing element (1,2).
15
2. Reflector system according to claim 1, characterized in that each end of the circular part of the securing element has ends (1a) bent in towards the arc of the circle, and also a gripping recess (13) so that the bent ends (1a) pass back through the hole (8) in the reflector (4), and the gripping recess (13) engages in the hole (8) in the reflector.
20
- 25 3. Reflector system according to claim 1, characterized in that each end of the securing element has protruding ends (2a) and a gripping recess (13), and also in that the protruding ends (2a) are of such a length that they can lie up against a wall (9) in the fitting in which the light source (5) is mounted, in that the gripping recess (13) engages in the hole (8) in the reflector.
30
4. Reflector system according to claims 1 - 3,



characterized in that the extreme ends of the securing element (1, 2) are rounded off with a further bend.



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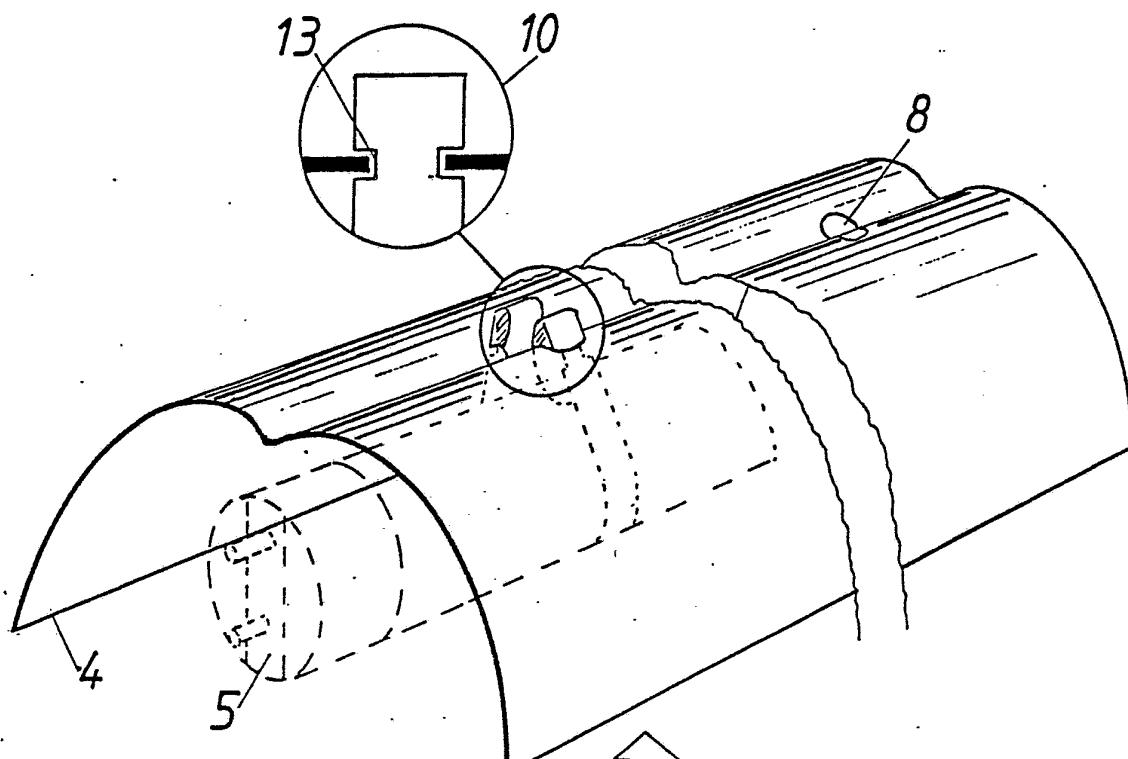


Fig. 1

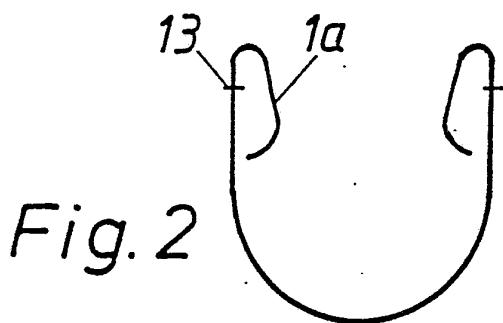
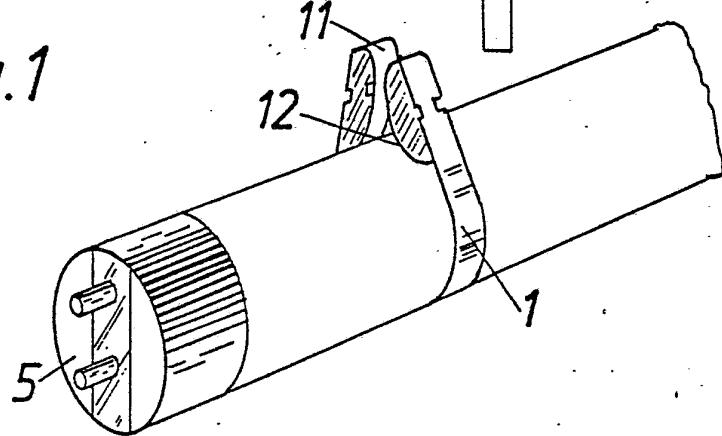


Fig. 2

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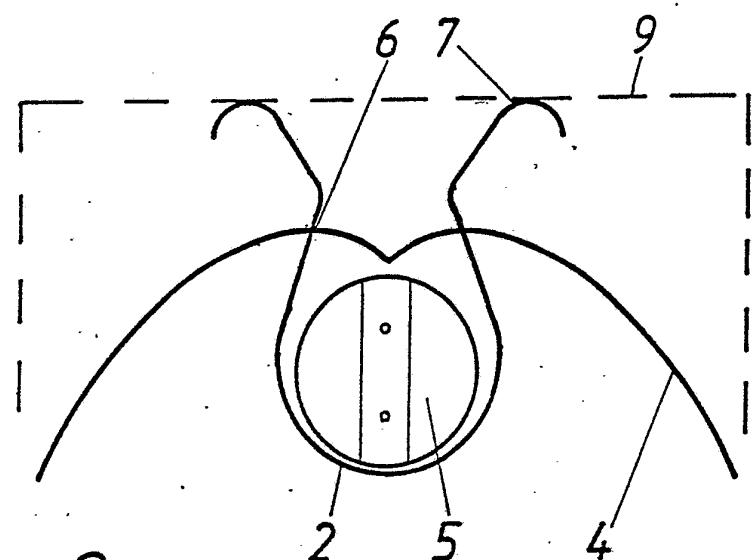


Fig. 3

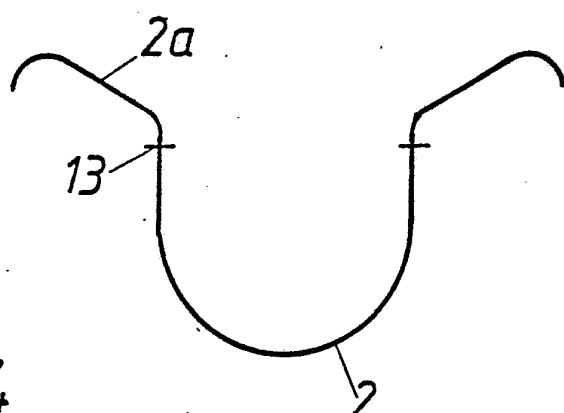


Fig. 4

INTERNATIONAL SEARCH REPORT

International Application No. PCT/DK82/00111

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³

According to International Patent Classification (IPC) or to both National Classification and IPC 3

F 21 V 17/04, 7/12

II. FIELDS SEARCHED

Minimum Documentation Searched ⁴

Classification System	Classification Symbols
IPC 3	F 21 S 3/00, F 21 V 17/00, 17/04, 19/00, 7/12, 7/14, H 01 R 33/00, 33/06
National Cl	4b:5/01, 7, 8, 9/01, 12, 14; 21f:53, 54, 55.../...

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched ⁵

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴

Category ⁶	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
X	SE, B, 312 379 (AMP INC) 14 July 1969	1
X	SE, B, 365 600 (OY HELVAR) 25 March 1974	1
A	US, A, 2 741 694 (THOMSTAD M V ET AL) 10 April 1956	1

* Special categories of cited documents: ¹⁵

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search ¹⁹

1983-03-09

Date of Mailing of this International Search Report ²⁰

1983-03-10

International Searching Authority ²¹

Swedish Patent Office

Signature of Authorized Officer ²²

C-A Lannefors

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II

Fields Searched (cont)

US C1 240:51.11, 51.12;
362:216, 217, 226, 255, 436-438.

VI. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE¹⁰

This International search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. Claim numbers because they relate to subject matter¹¹ not required to be searched by this Authority, namely:

2. Claim numbers, because they relate to parts of the International application that do not comply with the prescribed requirements to such an extent that no meaningful International search can be carried out¹², specifically:

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING¹³

This International Searching Authority found multiple inventions in this International application as follows:

1. As all required additional search fees were timely paid by the applicant, this International search report covers all searchable claims of the International application.
2. As only some of the required additional search fees were timely paid by the applicant, this International search report covers only those claims of the International application for which fees were paid, specifically claims:
3. No required additional search fees were timely paid by the applicant. Consequently, this International search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
4. As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

The additional search fees were accompanied by applicant's protest.
 No protest accompanied the payment of additional search fees.