

LAMP WITH ADJUSTABLE REFLECTOR

The invention pertains to a lamp according to the introductory clause of Claim 1.

Various lamps with adjustable reflectors are known, in which rigid parts of the reflectors are supported so that they can pivot around their longitudinal axis with respect to the fluorescent tube. As a result, it is possible to deflect the beam characteristic of the reflector part in question as a whole in different directions, that is, upward, to the side, or downward. With the known devices, however, it is not possible with the known reflector to vary the beam characteristic over a wide range, such as between a wide-beam and a narrow-beam characteristic, or to give it an asymmetric characteristic.

The invention is therefore based on the task of improving a lamp of the general type indicated above in such a way that the beam characteristic of the reflector can be varied in this way over a wide range.

This task is accomplished according to the invention by the features of Claim 1.

Because of the ability to change the shape of the reflector either by bending it or by dividing it into several lengthwise strips hinged together and by adjusting the angle of the strips with respect to each other, it is very easy to change the beam characteristic over a wide range. The adjusting devices for shifting the longitudinal edges of the reflector can be very

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easily designed to operate mechanically, electrically, or in some other way. In the case of elastically flexible reflectors, it is necessary in all cases to adjust both ends of the longitudinal edges to ensure that the curvature of the reflector in question is uniform over its entire length.

Advantageous embodiments of the invention are explained in greater detail in the subclaims. Thus, Claims 2-9 are directed at various mechanical and/or motorized designs of the adjusting devices, whereas Claims 10-12 are directed at different effective designs of the reflector itself.

Preferred exemplary embodiments of the invention are explained in greater detail below on the basis of the figures:

- Figure 1 shows a schematic diagram of a partial cross section through a first embodiment of the lamp according to the invention, perpendicular to the longitudinal center plane of the lamp;

- Figure 2 shows a cross section similar to that of Figure 1 through a second embodiment of the lamp according to the invention; and

- Figure 3 shows a cross section similar to that of Figure 2 through the second embodiment with a different type of reflector shape.

The same or corresponding parts in the various figures are designated by the same reference numbers.

In the embodiment shown in Figure 1, the opaque, mirror-finish reflector 10, designated overall by the number 10, consists of two reflector halves 14, 16, which are symmetric to longitudinal center plane 12 of the lamp and which, in profile, have a circular curvature. Edges 18, 20 of the two reflector halves 14, 16 at center plane 12 are loosely held in pivoting fashion between approximately wedge-shaped, partially interlocking retaining elements 22, 24. The two retaining elements 22, 24 are parallel to center plane 12 and extend

over the entire length of the lamp. Longitudinal axis 26 of a fluorescent tube 28 installed above retaining elements 22, 24 coincides with center plane 12. Reflector 10 and fluorescent tube 28 also extend essentially over the entire length of the lamp between two perpendicular end walls, only one of which can be seen in Figure 1, namely, end wall 30 situated behind the plane of the drawing. Both retaining elements 22, 24 and fluorescent tube 28 are rigidly attached to the end walls.

In this embodiment, the two reflector halves 14, 16 consist of flexible material. A link block 34 is attached to each end of the free longitudinal edges 32 of the reflector halves near end walls 30; this block engages in and slides along a straight, upward- and inward-slanting link slot 36 in end wall 30. Only the longitudinal edge of the right reflector half 16 can be seen in Figure 1. When the link block is slid from lower position 34 at one end of link slot 36 to upper position 34' at the other end; the associated reflector half 16 is forcibly bent into a more highly curved position 16'. In the case of the embodiment shown here, the center point of the curvature of the more highly bent position 16' is approximately at point 38, whereas the center of curvature of the less curved position 16 would be far beyond the upper edge of the drawing. The link block has fastening devices (not shown), such as set screws or the like, to hold it in one of the end positions 34, 34' or possibly in a selected intermediate position somewhere along link slot 36. In the case of a different design (not shown), a motor is provided to move link block 34 along link slot 36.

Because, in this embodiment, the material of reflector 10 is elastically flexible, it is necessary, of course, to provide rear wall 30 situated in above the plane of the drawing, which therefore cannot be seen in Figure 1,

with an adjusting device similar to that on rear end wall 30, so that similar adjustments can be made at both ends. Thus each reflector half 14, 16 will have a uniform curvature all the way along.

Whereas the light being beamed upward from fluorescent tube 28 is usually unhindered, most of the light being beamed laterally and downward is reflected by reflector 10; and, depending on the curvature of the reflector, this light exits at various angles in a more-or-less upward direction. For the right reflector half 16, several representative beam paths 40 of the light proceeding from fluorescent tube 28 to reflector half 16 are shown in Figure 1. The beams reflected from the reflector half in its less curved position 16 are drawn in solid line, whereas the beams reflected from the reflector in its more highly curved position 16' are shown in broken line. In the case of less curved position 16', all of the reflected beams fall within an angle 42 indicated by shading, which is relatively narrow and which points laterally upward, whereas, in the case of more highly curved position 16', a much wider, essentially upward-directed, reflected-light region 44 is obtained, which can even be asymmetric to center plane 12 in some cases.

Because link slot 36 or some other type of adjusting device (not shown) can have any desired inclination, length, and shape and can be designed in almost any desired way, all of which can be easily realized by the expert, reflector 10 can be given many different positions and curvatures, it being assumed that similar adjusting devices are also provided at end wall 30 situated in front of the plane of the drawing and on the left halves of the two end walls. The adjusting devices can be connected to each other by gears or synchronized by motorized drives, so that reflector 10 can be adjusted easily and precisely over a wide range. The reflector can be adjusted either at the

factory or at the installation site to suit the concrete application.

The embodiment shown in Figures 2 and 3 differs from that of Figure 1 in that reflector 10 is made of rigid or less flexible material and is divided into several adjoining longitudinal strips 46, 48, 50, 52. Center strips 46, extending along both sides of center plane 12, and outermost longitudinal strips 52, extending along the sides of reflector 10, remain essentially stationary even during the adjustment of reflector 10. Between stationary longitudinal strips 46, 52, two movable longitudinal strips 48, 50 are arranged on both sides, with are connected not only to each other but also to the fixed middle strip 46 by hinge joints 54, 56.

At the free edge 32 of outer movable longitudinal strip 50, a link block 34 is attached, which can slide in a link slot 36 in end wall 30 to an upper end position 34' in the same way as in the embodiment according to Figure 1. Again, by means of fastening devices (not shown) or motorized drives, it is possible to fix the strips in position in any desired intermediate point along link slot 36. If longitudinal strips 48, 50 are sufficiently stiff over the entire length of the lamp, it is possible in this embodiment to adjust free edge 32 at only one end near rear end wall 30. Because of the stiffness of the strips, the adjustment is transmitted all the way to forward end wall 30 situated in front of the plane of the drawing. In the extreme case, the forward end of the strip at forward end wall 30 does not even have to be guided in an adjusting device but will rather simply follow at this end wall the adjusting movement occurring at rear end wall 30.

In this embodiment, stationary outer longitudinal strips 52 of reflector 10 are not adjusted and thus do not contribute to the change of the beam characteristic of reflector 10; they serve only to prevent blinding light from

being beamed out straight to the side or slightly upward.

Figure 2 also shows several representative beam paths 40 of the light proceeding from fluorescent tube 28 on both sides of center plane 12. When reflector 10 is in the position according to Figure 2, the beams reflected by reflector 10 fall on both sides of center plane 12 in shaded angular areas 42. It can be seen that, in addition to the unhindered upward passage of light from fluorescent tube 28, the light being beamed downward and to the side is reflected by reflector 10 so that it, too, proceeds essentially upward.

In the diagram of Figure 3, the adjusting device on the left side of reflector 10 is moved by displacement of link block 34 to position 34'; as a result, movable longitudinal strips 48, 50 of reflector 10 have been pivoted into more steeply angled position 48', 50'. Whereas the beam characteristic of the right half of reflector 10 remains the same as it was in Figure 2, the beam characteristic of the left half of reflector 10 according to Figure 3 is now added to that of the right half. Because all of the beams reflected by the left half 48', 50' fall within an essentially expanded angle 44, what is obtained now is a highly asymmetric beam characteristic directed upward and to the right. If the right half of reflector 10 were now to be adjusted in the same way as the left half according to Figure 3, a wide-beam light pattern extending down as far as the horizontal plane would be obtained, which differs significantly from the beam characteristic of Figure 2. By using the adjusting device to select an intermediate position, it is possible to obtain any desired beam characteristic of the lamp ranging between narrow-beam and wide-beam and even including various types of asymmetric beam.

In this embodiment, too, it is possible for the desired adjustment of the reflector to be made either right in the factory or on site as needed. The

factory needs to produce only a single lamp for a wide variety of applications, since the lamp can be adapted to the specific application in question by adjustment of the desired beam characteristic.

CLAIM(S)

1. Lamp with at least one long fluorescent tube and a long, adjustable reflector with a trough-like shape, the longitudinal center plane of which contains the longitudinal axis of the fluorescent tube, characterized in that the shape of the reflector (10) is variable, and in that adjusting devices (34, 36) for changing the position of the free longitudinal edges (32) of the reflector (10) are provided at least at one end of the reflector (10), the change of position forcing the shape of the reflector (10) to change also.

2. Lamp according to Claim 1, characterized in that each end of the reflector (10) is held in a vertical end wall (30) of the lamp.

3. Lamp according to Claim 1 or Claim 2, characterized in that an adjusting device (34, 36) for each free longitudinal edge (32) of the reflector (10) is provided at both end walls (30).

4. Lamp according to one of the preceding claims, characterized in that each adjusting device (34, 36) consists of a link block, the link slot (36) being located in the associated end wall (30), whereas the link block (34) is attached to the free longitudinal edge (32) of the reflector (10).

5. Lamp according to one of the preceding claims, characterized in that the adjusting devices (34, 36) can be fixed in any desired position.

6. Lamp according to one of the preceding claims, characterized in that two or more adjusting devices (34, 36) are connected by a set of gears or rods, which transmit the adjusting movement of an adjusting device to the other adjusting devices (34, 36).

7. Lamp according to one of the preceding claims, characterized in that each adjusting device has a motorized drive.

8. Lamp according to Claim 7, characterized in that at least one adjust-



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ing device with motorized drive is assigned to each free longitudinal edge (32) of the reflector (10).

9. Lamp according to Claim 8, characterized in that all the motorized drives are synchronized with each other.

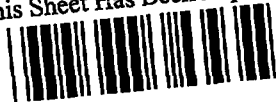
10. Lamp according to one of the preceding claims, characterized in that the reflector (10) is divided along the center plane (12) into two one-piece parts (14, 16), the edges (18, 20) of the two parts (14, 16) at the center plane (12) being mounted in such a way that they can pivot.

11. Lamp according to one of the preceding claims, characterized in that the reflector (10) is divided into several longitudinal strips (46, 48, 50), the adjoining edges of which are hinged to each other.

12. Lamp according to Claim 11, characterized in that each reflector (10) has an outer edge strip (52), which is not connected to the longitudinal edge (32) of the rest of the reflector (10) but is attached rigidly to the end walls (30).



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