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F4R
Selected US specifications from IPC sub-class F21V

(54) Spotlight and accessories therefor

(57) A spotlight includes a housing (1), a lamp in the housing, a lens system for producing a beam of light, and a beam modifying device (7, 13) in the optical path defined through the housing. The beam modifying device is arranged to define a predetermined path of illumination from the luminaire, the path not being symmetrical about all axes perpendicular to and passing through the optical path. The beam modifying device is mounted on the housing for rotation about the axis of the optical path and is secured to an arm which projects from the housing and by which the beam modifying device can be rotated. The beam modifying device may include a gobo or one or more shutter elements.

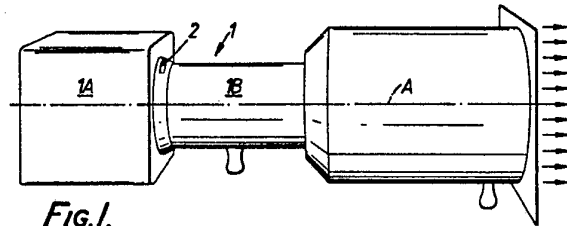


Fig. 1.

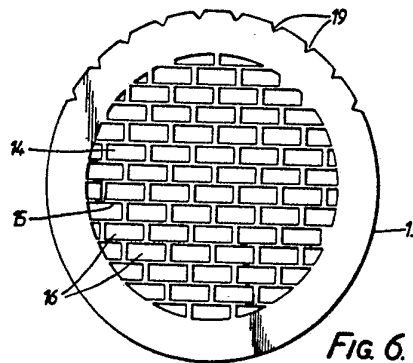


Fig. 6.

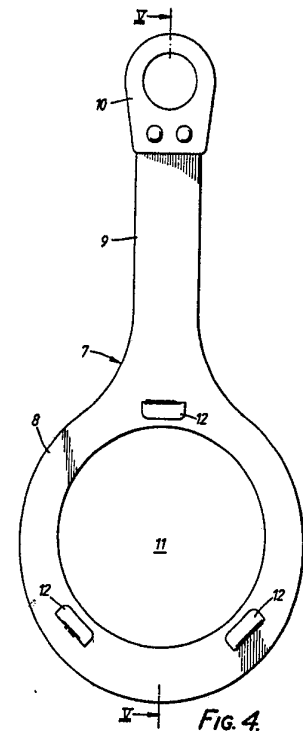


Fig. 4.

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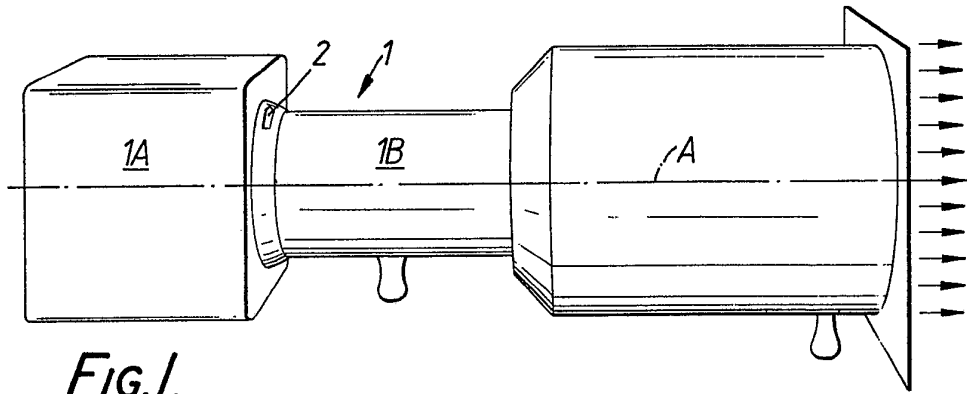


FIG. 1.

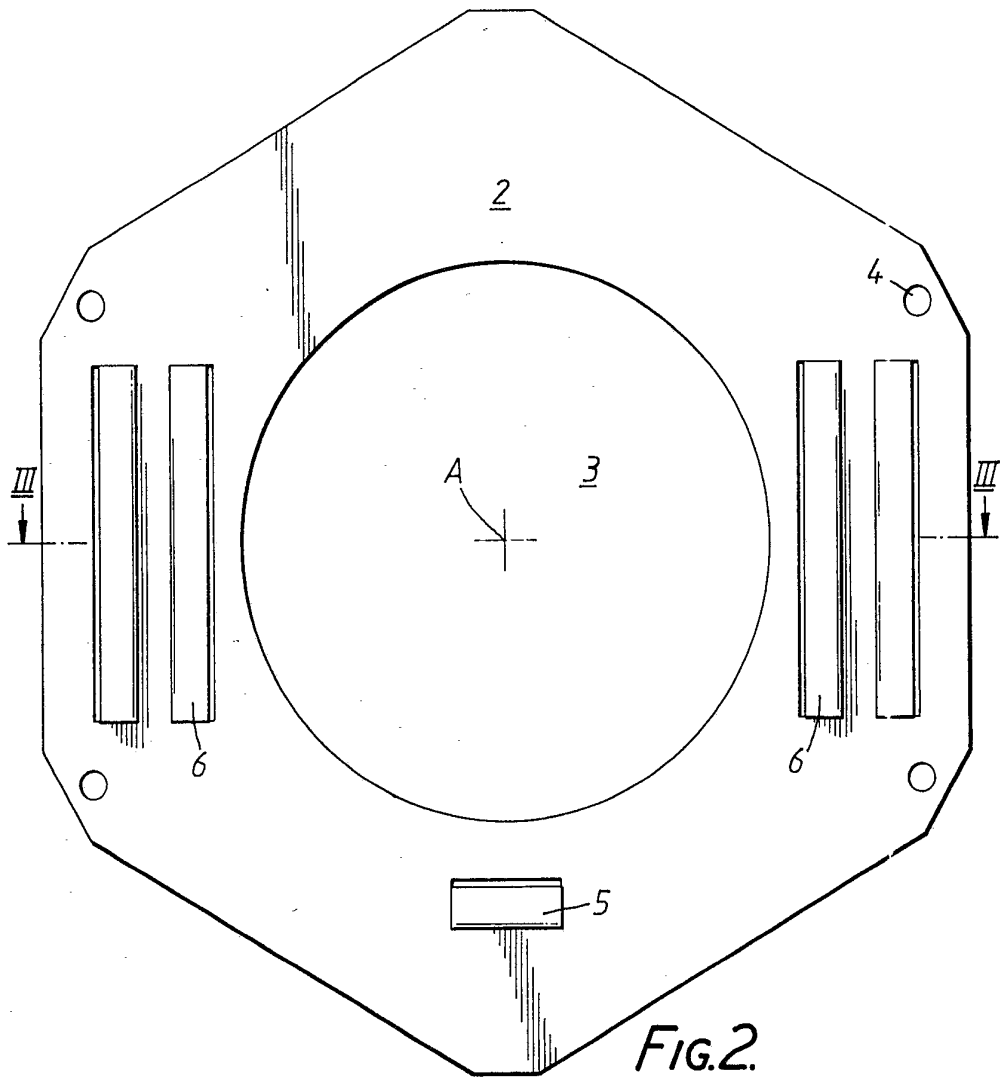


FIG. 2.

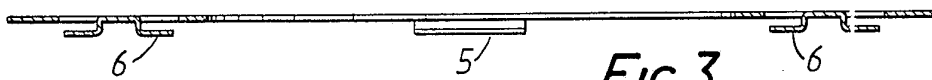


FIG. 3.

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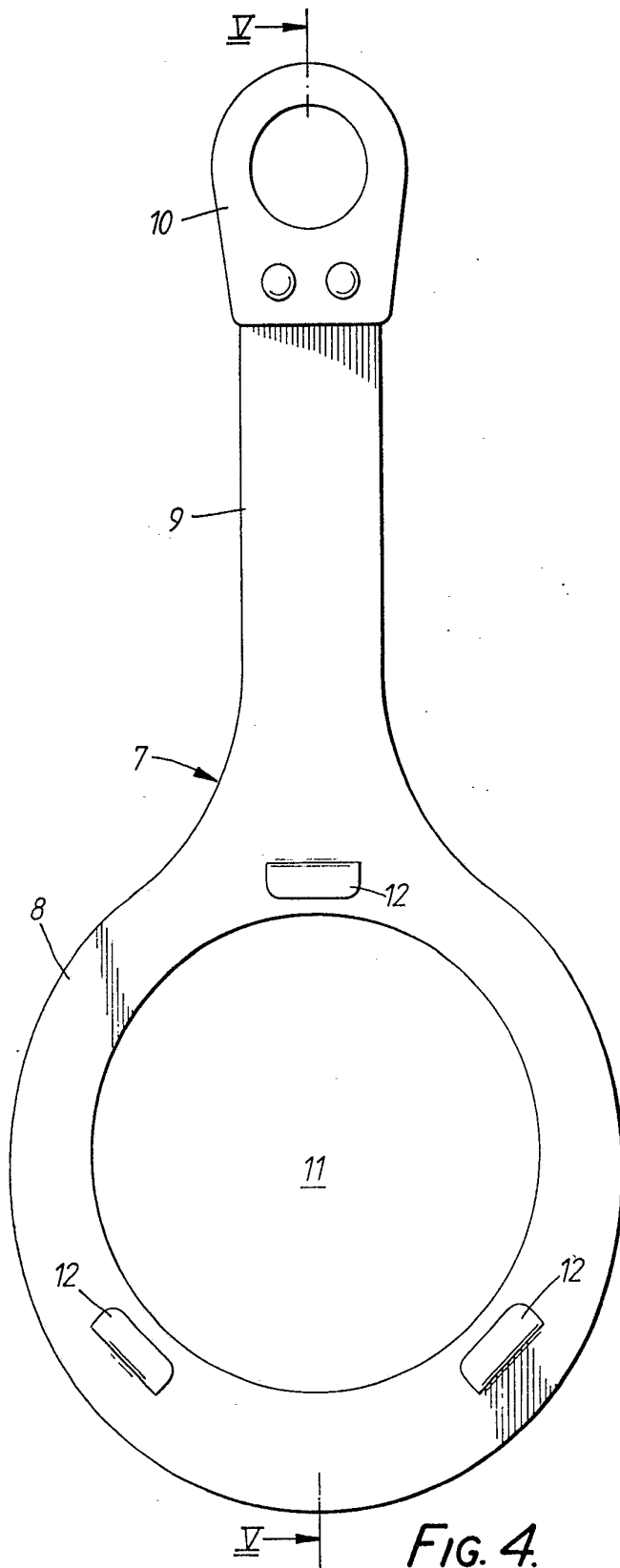


FIG. 4.

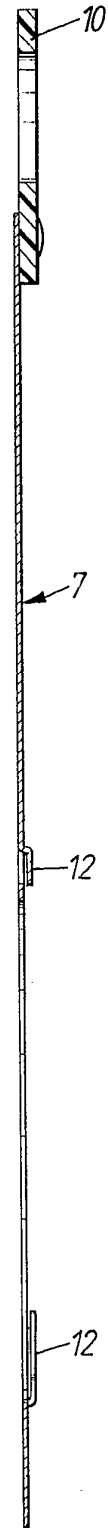


FIG. 5.

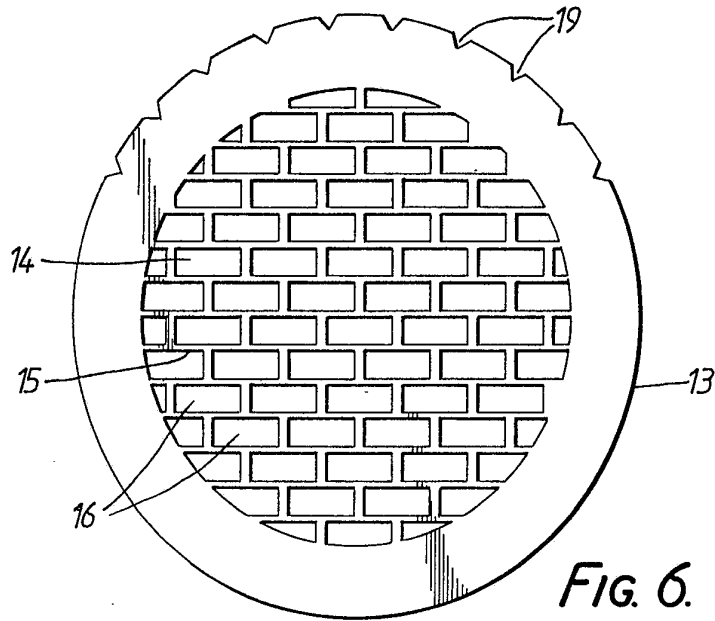


FIG. 6.

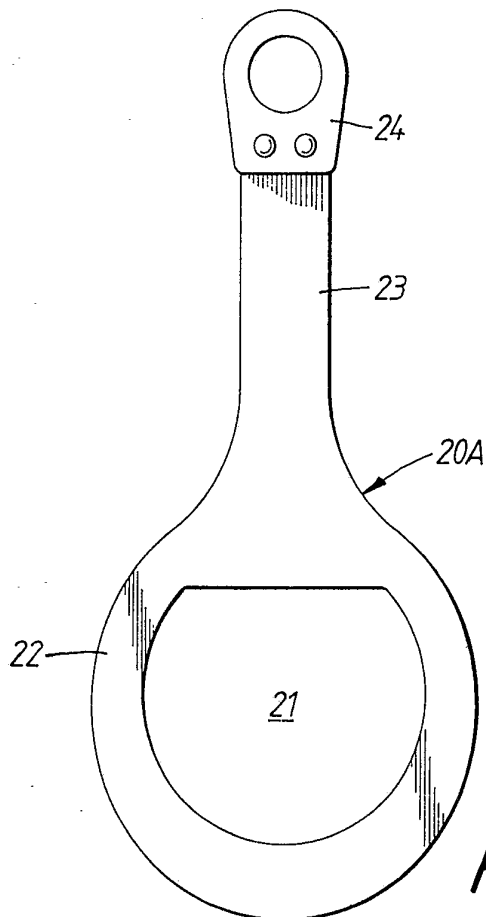


FIG. 7A.

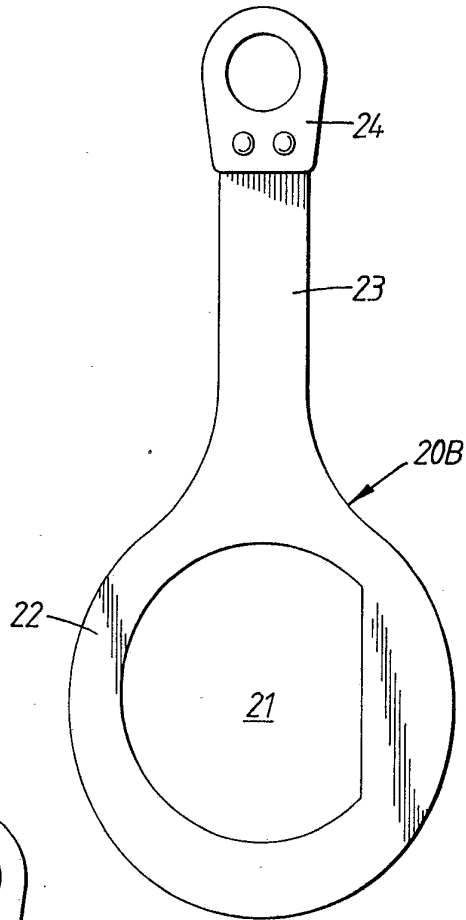


FIG. 7B.

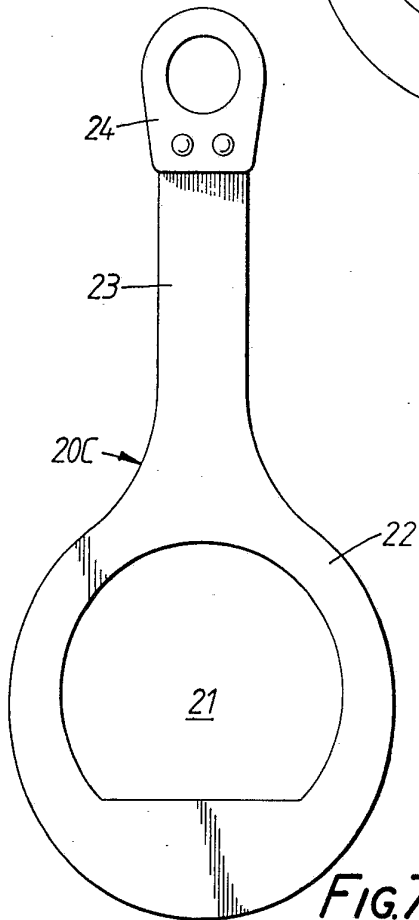


FIG. 7C.

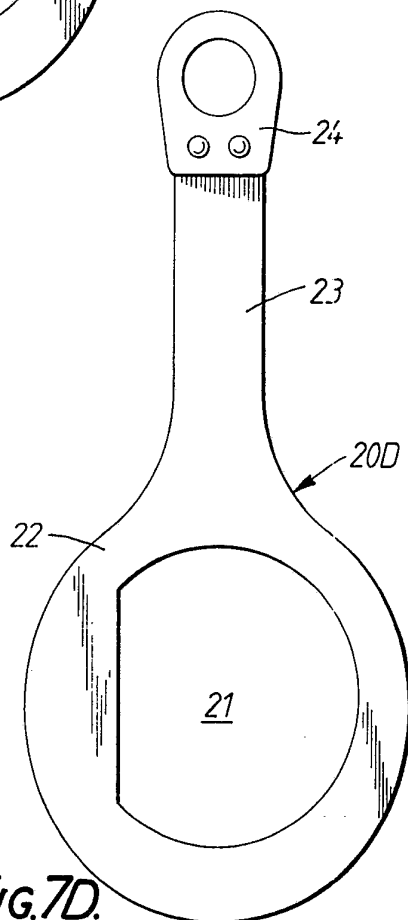


FIG. 7D.

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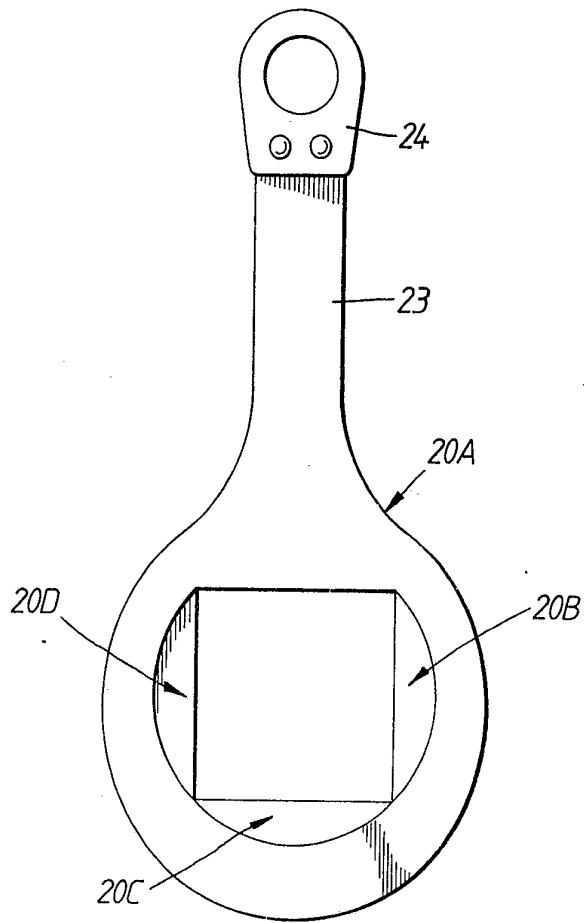


FIG. 8.

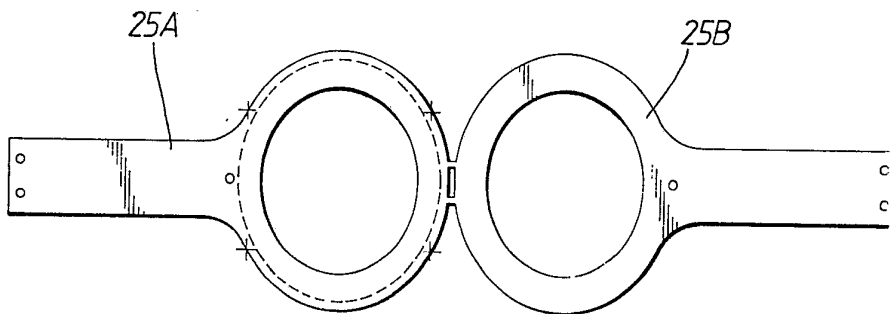


FIG. 9.

SPECIFICATION

Spotlight and accessories therefor

- 5 This invention relates to spotlights such as may for example be used for stage lighting and to accessories therefor, in particular, but not exclusively, gobos and shutters.
- 10 The term "gobo" when used in this specification is to be understood as referring to a device which is interposed in the optical path of a spotlight to cause the spotlight to project a pattern or image of some kind rather than a plain uninterrupted beam.
- 15 Such gobos have in the past commonly been mounted on a holder which can then be inserted into the spotlight housing. The gobo is detachably mounted on the holder in a manner that allows its orientation around the optical path to be altered. The alteration is most readily accomplished by removing the holder from the housing, repositioning the gobo and then placing the holder and gobo back in the housing. Such a process is time consuming and cumbersome and does not allow for very accurate adjustment. In an alternative arrangement designed to mitigate these disadvantages the peripheral edge of the gobo is notched over a portion of its length so that a tool can be inserted from outside the housing of the spotlight and, by engaging one of the notches with the tool, the gobo can be rotated. The technique is not straightforward, however, because of the difficulty of accurately positioning the gobo with the tool.
- 20 Spotlights are also commonly provided with shutters which limit the size of beam projected by blanking off one or more edge portions of the beam. One form of shutter assembly found in a spotlight comprises four separate shutter elements which project into the optical path in the spotlight housing from respective sides. Each element is slideable in the housing to enable the extent to which the element projects into the optical path to be adjusted. Such a shutter assembly might for example be used when a spotlight is directed at a doorway in order to match the edges of the spotlight beam to the edges of the doorway. When setting up the spotlight, each of the shutter elements has to be adjusted individually to provide the desired shape of beam. Also while the orientation of the elements can be adjusted to some extent this adjustment is restricted by the nature of their mounting. If the spotlight is then used for a different purpose the shutter elements must be readjusted even if it is desired to return in due course to the previous shape of beam. Thus while the shutter assembly is relatively complicated and expensive to manufacture, it is relatively cumbersome to use.
- 25 It is an object of the invention to provide a spotlight which mitigates at least some of the disadvantages described above.

It is another object of the invention to provide an improved gobo arrangement for a spotlight.

- 70 It is another object of the invention to provide an improved shuttering arrangement for a spotlight.

The present invention provides a spotlight including a housing, a lamp in the housing, a lens system for producing a beam of light, and a beam modifying device in the optical path defined through the housing, the beam modifying device being arranged to provide a predetermined pattern of illumination from the luminaire, which pattern is not symmetrical about all axes perpendicular to and passing through the optical path, wherein the beam modifying device is mounted in the housing for rotation about the axis of the optical path and is secured to an arm which projects from the housing and by which the beam modifying device can be rotated.

80 While the beam modifying device is described as being mounted in the housing for rotation, it should be understood that this does not mean that the device will be rotatable through 360°. Indeed in embodiments of the invention to be described the angle through which the device can be rotated is of the order of 90° and angles of rotation much smaller than this can still give useful results. Relatively small angles of rotation are acceptable because it is possible to arrange for the beam modifying device to be oriented at approximately the correct angle without making use of the rotational facility and to then be adjusted to the precise orientation required by rotating the device through a small angle.

90 According to one aspect of the invention the beam modifying device includes a shutter element which projects into the optical path and defines a boundary of a part of the beam. The arm and the shutter element may be integral with one another. Such a device can be made very simply and cheaply from sheet metal.

105 Preferably the beam modifying device includes a stack of separate shutter elements, respective ones of which modify different parts of the beam, and the stack of elements are releasably secured together in a pre-determined relationship. With such an arrangement the shutter elements can be adjusted relative to one another to provide a desired shuttering effect and can be clamped in that position.

110 Thereafter, the stack of elements can be removed from the light, for example, to enable it to be used for another purpose and when the shuttering is required again the sets of shutter elements can be replaced in the housing to provide the same effect without any readjustment of the elements being necessary.

120 The shutter elements may be mounted for rotation relative to one another and may be clamped in a desired rotational position relative to one another, the clamped assembly of

elements being itself mounted in the housing for rotation about the axis of the optical path. The shutter elements may be rotatably mounted on a carrier for rotation relative to one another and may be clamped in a fixed position on the carrier, the carrier being mounted for rotation in the housing.

According to another aspect of the invention the beam modifying device is a gobo which is mounted on a carrier made separately therefrom. The gobo may be mountable on the carrier in different orientations displaced about the axis of the optical path. Such an arrangement greatly facilitates accurate adjustment of the orientation of the gobo. The gobo can first be mounted on the carrier in approximately the desired orientation, and then be inserted into the spotlight housing and angularly adjusted to the precise orientation required by moving the arm which projects from the housing.

The present invention also provides a beam modifying device for location in the optical path of a spotlight and for rotation about the axis of the optical path, the beam modifying device including a gobo mounted on a carrier, the carrier including an arm which projects away from the axis of rotation and by which the gobo and carrier assembly can be rotated.

The present invention also provides a beam modifying device for location in the optical path of a spotlight and for rotation about the axis of the optical path, the beam modifying device including at least one shutter element, which is arranged to project into the optical path and define a boundary of a part of the beam, and an arm which projects away from the axis of rotation and by which said at least one shutter element can be rotated.

By way of example certain illustrative embodiments of the invention will now be described with reference to the accompanying drawings, of which:

Fig. 1 is a perspective view of a theatre spotlight.

Fig. 2 is a plan view of a part of the spotlight housing,

Fig. 3 is a sectional view along the lines III-III of Fig. 2,

Fig. 4 is a plan view of a gobo carrier,

Fig. 5 is a sectional view along the lines V-V of Fig. 4,

Fig. 6 is a plan view of a gobo mountable on the carrier of Fig. 4,

Figs. 7a to 7d are plan views of various shutter elements,

Fig. 8 is a plan view of the elements of Figs. 7a and 7d stacked together, and

Fig. 9 is a plan view of an alternative form of gobo carrier partly assembled.

The spotlight shown in Fig. 1 has a housing 1 having a rear section 1A in which a lamp-holder and lamp together with a reflector (not shown) are provided and a front section 1B which houses a zoom lens system. A beam of

light is emitted from the spotlight along its longitudinal axis A, this also being the axis of the optical path through the spotlight. At the interface of the sections 1A and 1B of the housing a transverse plate 2, shown in Figs. 2 and 3 is provided. The plate 2 has a central opening 3 concentric with the optical path and through which light passes to the lens system. The plate 2 has holes 4 in its periphery through which pass bolts which secure together the housing sections 1A and 1B. Towards the bottom of the plate 2 a pressed out lip 5 is provided and on either side of the opening 3 similar pressed out lips 6 are provided.

The gobo carrier 7 shown in Figs. 4 and 5 is formed from sheet metal having an approximately circular end 8 and an integral arm 9 on the end of which a thermally insulating handle 10 is secured. The circular end 8 has a central opening 11 therethrough and three pressed out lips 12 are provided spaced around the opening 11.

The gobo 13 shown in Fig. 6 has a generally circular perimeter matched to the spacing of the lips 12 and is so thin that it is sufficiently flexible to be fitted under the lips 12. A portion of the perimeter is provided with a series of notches 19. The whole of the central area 14 of the gobo 13 is made up of opaque parts 15 and openings 16 which in this particular example depict a brick wall. It should be understood, however, that other patterns may be provided by such a gobo.

In use, the gobo 13 is located on the carrier 7 with the edges of the gobo located under the lips 12 and with the gobo in approximately the desired orientation with the arm 9 of the carrier projecting upwardly from the circular end 8. The circular end 8 of the carrier is then inserted through an opening in the top of the spotlight housing alongside the transverse plate 2, the side edges of the end 8 engaged under the lips 6 on the plate 2 and the carrier inserted until the end 8 engages under the bottom lip 5 on the plate 2. In this position the central area 14 of the gobo, the opening 11 in the carrier and the opening 3 in the plate are concentric and the central area 14 of the gobo is in the optical path of the spotlight and on, or very close to, the focal plane of the spotlight so that when the lamp is turned on the spotlight projects the pattern of the central area 14 of the gobo.

In order to adjust the orientation of the gobo to exactly the desired orientation the arm 9 projecting out of the top of the spotlight housing is rotated about the axis A. The arm is able to rotate through an angle of the order of 90°.

The plate 2 may alternatively be used to mount a shutter element 20 which may for example be any of the kinds shown in Figs. 7a to 7d and referenced 20A to 20D respectively. Each of these shutter elements has an

opening 21 which is of similar size and shape to the opening 3 in the plate 2 except that the opening is closed off along one portion bounded by a chord of the notional circular opening. It will be noted that the shutter elements 20A to 20D differ from one another only in respect of the shape of the opening 21. Each shutter element 20 is made of sheet metal, and has an approximately circular end 22 and an integral arm 23 on which an insulating handle 24 is provided.

While four shutter elements have been shown in Figs. 7a to 7d it will be appreciated that any number of elements may be provided having different shapes and sizes of opening. A shutter element can be mounted on the plate 2 in the same way as the gobo carrier 7 and can be rotated to exactly the desired orientation by means of the arm 23.

In order to provide even greater versatility, a number of separate shutter elements, for example the four elements 20A to 20D shown in Figs. 7a to 7d, may be assembled together in a stack as shown in Fig. 8. The elements 20A to 20D may be rotatably mounted on a common carrier (not shown) and that carrier may in turn be arranged to engage the lips 5 and 6 on the plate 2. In such a case a clamping mechanism is provided to clamp the elements 20A to 20D relative to the carrier and thus prevent relative rotation of the elements 20A and 20D.

With a shutter assembly of this kind, it is possible to set up the assembly in a spotlight to provide a desired shape of beam, and then having clamped the elements in position relative to one another to remove the entire assembly and use the spotlight for another purpose, either without a shutter assembly or with a different shutter assembly. If it is then desired to return to the original shape of beam, it is only necessary to put back the original shutter assembly and adjust the whole assembly rotationally to the correct position.

While the shutter elements shown in Figs. 7a to 7d have straight edges in the beam of the spotlight, other forms of edge may be employed: for example, a jagged edge or an edge which is only partially opaque may be used in order to provide a soft edge to the beam. Also it is possible to provide a shutter element with portions that can be broken off to alter the size and/or shape of the opening 21.

It will be noted that the "circular" ends of the gobo carrier 7 and the shutter elements 20 are actually not quite circular and that the lip 5 is spaced slightly further from the optical axis of the spotlight than the lips 6. The spacing of the lips 5 and 6 arises as a result of other purposes served by these lips and not connected with the present invention. Were it not for the other purposes, it would be advantageous for the lips 5 and 6 to be equidistant from the optical axis and the "circular" ends

of the gobo carrier 7 and the shutter elements 20 would then preferably be exactly circular.

An alternative form of gobo carrier is shown in Fig. 9. The carrier has two halves 25A and 25B connected together by an integral hinge. A gobo can be placed on one half of the carrier as indicated in dotted outline in Fig. 9 and the other half then pivoted through 180° about the integral hinge, sandwiching the gobo between the two carrier halves and creating a gobo carrier of similar form to that shown in Figs. 4 to 6. Fastening means (not shown) may be provided for securing the two halves together.

CLAIMS

1. A spotlight including a housing, a lamp in the housing, a lens system for producing a beam of light, and a beam modifying device in the optical path defined through the housing, the beam modifying device being arranged to provide a predetermined pattern of illumination from the luminaire, which pattern is not symmetrical about all axes perpendicular to and passing through the optical path, wherein the beam modifying device is mounted in the housing for rotation about the axis of the optical path and is secured to an arm which projects from the housing and by which the beam modifying device can be rotated.

2. A spotlight according to claim 1 in which the beam modifying device includes a shutter element which projects into the optical path and defines a boundary of a part of the beam.

3. A spotlight according to claim 2 in which the arm and the shutter element are integral with one another.

4. A spotlight according to claim 2 or 3 in which the beam modifying device includes a stack of separate shutter elements respective ones of which modify different parts of the beam and wherein the stack of elements are releasably secured together in a predetermined relationship.

5. A spotlight according to claim 4 in which the shutter elements are mounted for rotation relative to one another and are clampable in a desired rotational position relative to one another, and in which the clamped assembly of elements is itself mounted in the housing for rotation about the axis of the optical path.

6. A spotlight according to claim 5 in which the shutter elements are rotatably mounted on a carrier for rotation relative to one another and are clampable in a fixed position on the carrier, the carrier being mounted for rotation in the housing.

7. A spotlight according to claim 1 in which the beam modifying device is a gobo which is mounted on a carrier made separately therefrom.

8. A spotlight according to claim 7 in which the gobo is mountable on the carrier in different orientations displaced around the axis of the optical path.

9. A spotlight substantially as herein described with reference to and as illustrated by the accompanying drawings.

5 10. A beam modifying device for location in the optical path of a spotlight and for rotation about the axis of the optical path, the beam modifying device including a gobo mounted on a carrier, the carrier including an arm which projects away from the axis of rotation and by
10 which the gobo and carrier assembly can be rotated.

11. A beam modifying device for location in the optical path of a spotlight and for rotation about the axis of the optical path, the beam
15 modifying device including at least one shutter element, which is arranged to project into the optical path and define a boundary of a part of the beam, and an arm which projects away from the axis of rotation and by which said at
20 least one shutter element can be rotated.

12. A device according to claim 11 including a stack of shutter elements for modifying different parts of the beam, the elements being releasably secured together in a predetermined relationship.
25

13. A beam modifying device for location in the optical path of a spotlight and for rotation about the axis of the optical path, the beam modifying device being substantially as herein
30 described with reference to and as illustrated by Figs. 4 to 6 of the accompanying drawings.

14. A beam modifying device for location in the optical path of a spotlight and for rotation
35 about the axis of the optical path, the beam modifying device being substantially as herein described with reference to and as illustrated by any of Figs 7a to 7d or by Fig. 8 of the accompanying drawings.