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(54) **Projection clock**

(57) A projection clock (1) is described, comprising a housing (2) with an emission opening (7) for a light beam (14). The housing (2) comprises at least a light source (10), a clock with a reflecting dial (11), and a lens (16). During operation of the projection clock (1), a light beam (14) coming from the light source (10) is at least reflected by the reflecting dial (11) of the clock and then issues from the housing via the lens (16). The housing (2) is further provided with at least one light-directing member (12). The mutual positions of the light source (10), the reflecting dial (11) of the clock, the light-directing member (12), and the lens (16) are such that the light beam (14) is reflected both by the reflecting dial (11) of the clock and by the light-directing member (12) before this light beam (14) leaves the housing via the lens (16).

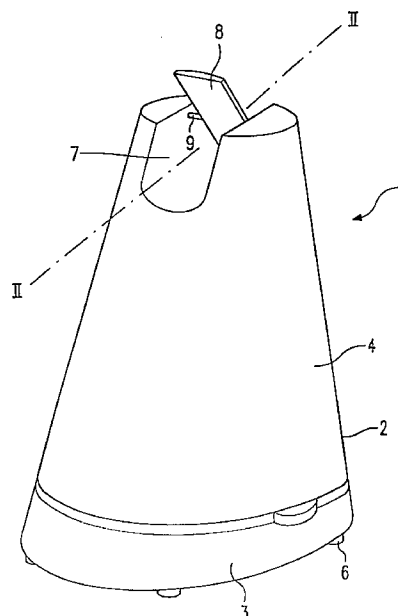


FIG. 1

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Description

The invention relates to a projection clock comprising a housing with an emission opening for a light beam, which housing comprises at least a light source, a clock with a reflecting dial, and a lens, a light beam from the light source being at least reflected by the reflecting dial of the clock during the operation of the projection clock and subsequently leaving the housing through the lens.

Such a projection clock is known from and is described in the US patent document US-A-5,247,492. The projection clock described in this publication comprises a housing which is provided with a(n incandescent) lamp at one side with a converging lens placed in front of the lamp, and which is provided with a reflecting dial at the other side. In addition, the housing is coupled to a closing cover which is fitted with a diverging lens which is placed in line with the reflecting dial of the clock, while a converging element is arranged in line with the lamp. A fan is also included in the housing. When the projection clock is switched on, the lamp will radiate light and the fan will start running, so that the heat generated by the lamp is dispersed and possibly removed. The light issuing from the lamp is concentrated by the converging element, and the resulting light beam is passed through the converging lens onto the reflecting dial, where the beam is reflected, and subsequently leaves the housing through the diverging lens and is projected on an object.

The above projection clock, however, has a number of disadvantages. First, the housing must be comparatively bulky because the lamp must be positioned at a certain angle to and at a certain distance from the reflecting dial in order to achieve the desired reflection from the dial. Furthermore, it is necessary for a fan to be present in the housing to disperse and remove the heat generated by the lamp. Such a fan causes a noise which is often perceived as unpleasant. Finally, the reflecting dial of the clock is so positioned in the housing that its removal and exchange, as applicable, can only be performed in a complicated manner, if at all.

The present invention has for its object to avoid the above disadvantages and accordingly provides a projection clock as defined in the opening paragraph which is characterized in that the housing is in addition provided with at least one light-directing member, while the light source, the reflecting dial of the clock, the light-directing member, and the lens are positioned in relation to one another such that the light beam is reflected both by the reflecting dial of the clock and by the light-directing member before the light beam issues from the housing via the lens.

Since the light beam originating from the light source is reflected both by the light-directing member and by the reflecting dial before leaving the housing, the beam can be as it were "folded up", so that the space required in the housing, and accordingly the volume thereof, can be reduced. Although the projection clock

of US-A-5,247,492 is provided with a converging element which may be construed as being a light-directing element according to the present invention, there is a fundamental difference between these elements. The converging element placed in line with the lamp concentrates and reflects light coming from this lamp, so that a single light beam is created which travels along the path described above. No "folding-up" of the light beam takes place here. In the present invention, however, the light beam coming from the light source is reflected by at least two separate elements, i.e. the light-directing member and the reflecting dial, whereby the light beam is "folded up" and occupies a comparatively small space in the housing. In the present invention, accordingly, the reflecting elements or members are placed in the path traveled by the light beam, whereas the converging element merely forms the source of the light beam in the projection clock according to US-A-5,247,492.

The light-directing member may comprise any member capable of guiding or reflecting a light beam such as, for example, a mirror, a prism, and the like.

The projection clock according to the invention is suitable for projecting the image of a dial of a running clock on, for example, a wall, ceiling, floor, staircase, or any other object.

In a special embodiment of the invention, the housing comprises a basic element on which a hollow body is detachably fastened.

In this embodiment of the projection clock, all or some of the various components of the housing, such as the light source, the clock with the reflecting dial, the light-directing member, and the lens are preferably coupled to or accommodated in the basic element, while the hollow body is fastened on the basic element so as to form the housing.

Preferably, the basic element is at least partly open at the lower side and thus forms an open passage between the interior of the housing and the surroundings, while the hollow body becomes narrower towards its upper side.

Such an embodiment of the housing renders it possible to dispense with the use of a fan inside the housing, which offers advantages especially as regards noise pollution.

In an advantageous embodiment, the clock with the reflecting dial is detachably accommodated in the housing, so that the clock with the reflecting dial can be taken from the projection clock in a simple manner and can be exchanged with a different one, if so desired.

A different picture can thus be projected each time through the exchange of the clock with the reflecting dial. Since in an advantageous embodiment the components of the clock are substantially coupled to or incorporated in the basic element, the clock with the reflecting dial is preferably detachably accommodated in the basic element.

In a preferred embodiment of the invention, the emission opening for the light beam is present at the

upper side of the housing.

Since the hollow body tapers towards the upper side and the lower side of the basic element is in open communication with the surroundings, the housing has a comparatively great opening at the lower side and a comparatively small opening at the upper side. Such a chimney shape contributes to a good ventilation inside the housing.

In an advantageous embodiment, the housing is provided with a second light-directing member which is positioned such that said second member is in the path of the light beam when the beam issues from the housing.

A light beam issuing from the housing can thus be reflected by the second light-directing member. Preferably, the second light-directing member is coupled to the housing with rotation possibility about a spindle such that a rotation of said member about said spindle changes the position of the projection on an object.

The invention will be explained in more detail below with reference to the accompanying drawing, in which:

- Fig. 1 diagrammatically shows a projection clock according to the invention;
- Fig. 2 diagrammatically shows a first embodiment of the projection clock in a cross-section taken on the line II-II in Fig. 1;
- Fig. 3 diagrammatically shows a second embodiment in a similar cross-sectional view; and
- Fig. 4 diagrammatically shows a third embodiment in a similar cross-sectional view.

The Figures are purely diagrammatic and not drawn true to scale. Some dimensions have been particularly exaggerated for the sake of clarity. Corresponding components have been given the same reference numerals as much as possible in the various Figures.

Fig. 1 shows an embodiment of a projection clock 1 according to the present invention. This projection clock comprises a housing 2 which is built up from a basic element 3 on which a hollow body 4 is detachably fastened. The detachable fastening between the basic element 3 and the body 4 may be formed by mutually engaging fastening means or other coupling means known to those skilled in the art or generally known. The basic element 3 is at least partly open at the lower side and is in addition provided with one or several support elements 6 by means of which the basic element 3 is as it were uncoupled from the ground surface and an open passage is created between the interior of the housing and the surroundings. Such an open passage is important for the cooling of the projection clock, so that the use of a fan inside the housing is not required. Since the hollow body 4 has a tapering shape towards the upper side, moreover, and is open at the top, the housing has a so-called chimney shape, so that an optimized cooling is provided by the shape of the housing.

The upper side of the housing 2 comprises an

emission opening 7 for a light beam. In addition, this opening 7 is provided with a second light-directing member 8 in the embodiment shown, which member comprises a mirror in the present example. The second member 8 is coupled to the housing 2 with hinging possibility about a spindle 9. The projection position of the dial on an object can be changed in that the second light-directing member 8 is rotated during the operation of the projection clock 1.

The operation of the projection clock according to the invention will now be explained in more detail with reference to Figs. 2 to 4. Figs. 2 to 4 show cross-sectional views of embodiments of the projection clock taken on the line II-II in Fig. 1. In these cross-sections, the basic element 3 is shown diagrammatically only and not true to scale. Figs. 2 to 4, moreover, only show one of the two assembling elements 17 between which the individual elements 10, 11, 12, 15, and 16 are positioned in the embodiments shown. The element 17 may be provided with fastening means of various designs for achieving the fastening of the individual elements 10, 11, 12, 15, and 16 in the desired configuration. The second, supplementary reflecting element 8 is always connected to a spindle 19 in Figs. 2 to 4. As was discussed above, however, the element 8 is preferably hinged about a spindle at the housing 2.

Fig. 2 shows a light source 10 which in the present example comprises a halogen lamp. Although such a lamp is preferred, it is alternatively possible to use a standard incandescent lamp, a concentration of the radiated light into a light beam taking place by means of a converging element as used, for example, in US-A-5,247,492. The essential factor, however, is that a beam of light is formed. The light beam 14 originating from the light source 10 is directed at a clock placed vertically above the light source and having a reflecting dial 11. The light beam 14 is reflected at an angle inter alia owing to the fact that the clock is obliquely positioned. The reflection of the beam 14 is caused by the reflecting action of the dial, and possibly also by the reflecting action of the hands on the dial. The light beam 14 then passes through a lens 15, which causes a centrally symmetrical mirroring of the image. Although only one lens is referred to in the above, it is obviously also possible to use several lenses in dependence on the path to be followed by the light beam 14. After passing through the lens, the light beam 14 is incident on a light-directing member 12 which is oriented at an angle such that the light beam 14 is directed vertically upward. The light-directing member 12 comprises a mirror in the embodiments shown; it is alternatively possible, however, to use a different light-directing member such as, for example, a prism. The light beam subsequently passes through a lens 16 which is placed in line with the emission opening of the projection clock, whereupon the image is reflected by the second light-directing member 8 and is projected onto an object such as, for example, a wall, a ceiling, a screen, etc..

Fig. 3 shows a preferred embodiment in which a light beam 14 coming from the light source 10 is reflected at an angle by the light-directing member 12 and is incident on the reflecting dial 11. From there the light beam continues at an angle through the lens 16 into the second light-directing member, where the light beam is reflected so as to be projected onto an object.

Finally, Fig. 4 shows an embodiment in which the light-directing member 12 comprises a one-way mirror. In the embodiment shown, a light beam 14 from the light source 10 passes fully through the non-reflecting side of the one-way mirror 12 up to the reflecting dial 11, where the beam is reflected and thus becomes incident on the reflecting side of the one-way mirror 12, whereby it is directed vertically upward.

Claims

1. A projection clock (1) comprising a housing (2) with an emission opening (7) for a light beam (14), which housing comprises at least a light source (10), a clock with a reflecting dial (11), and a lens (16), a light beam (14) from the light source (10) being at least reflected by the reflecting dial (11) of the clock during the operation of the projection clock (1) and subsequently leaving the housing (2) through the lens (16), characterized in that the housing (2) is in addition provided with at least one light-directing member (12), while the light source (10), the reflecting dial (11) of the clock, the light-directing member (12), and the lens (16) are positioned in relation to one another such that the light beam (14) is reflected both by the reflecting dial (11) of the clock and by the light-directing member (12) before the light beam (14) issues from the housing (2) via the lens (16).
2. A projection clock as claimed in Claim 1, characterized in that the housing (2) comprises a basic element (3) on which a hollow body (4) is detachably fastened.
3. A projection clock as claimed in Claim 2, characterized in that the basic element (3) is at least partly open at the lower side and thus forms an open passage between the interior of the housing (2) and the surroundings, and in that the hollow body (4) becomes narrower towards its upper side.
4. A projection clock as claimed in any one or several of the Claims 1 to 3, characterized in that the clock with the reflecting dial (11) is detachably accommodated in the housing (2).
5. A projection clock as claimed in Claim 3, characterized in that the clock with the reflecting dial (11) is detachably accommodated in the basic element (3).
6. A projection clock as claimed in any one or several of the preceding Claims, characterized in that the emission opening (7) for the light beam (14) is present at the upper side of the housing (2).
7. A projection clock as claimed in any one or several of the preceding Claims, characterized in that the housing (2) is provided with a second light-directing member (8) which is positioned such that said second member (8) is in the path of the light beam (14) when the beam (14) issues from the housing (2).
8. A projection clock as claimed in Claim 7, characterized in that the second light-directing member (8) is coupled to the housing (2) with rotation possibility about a spindle (9).

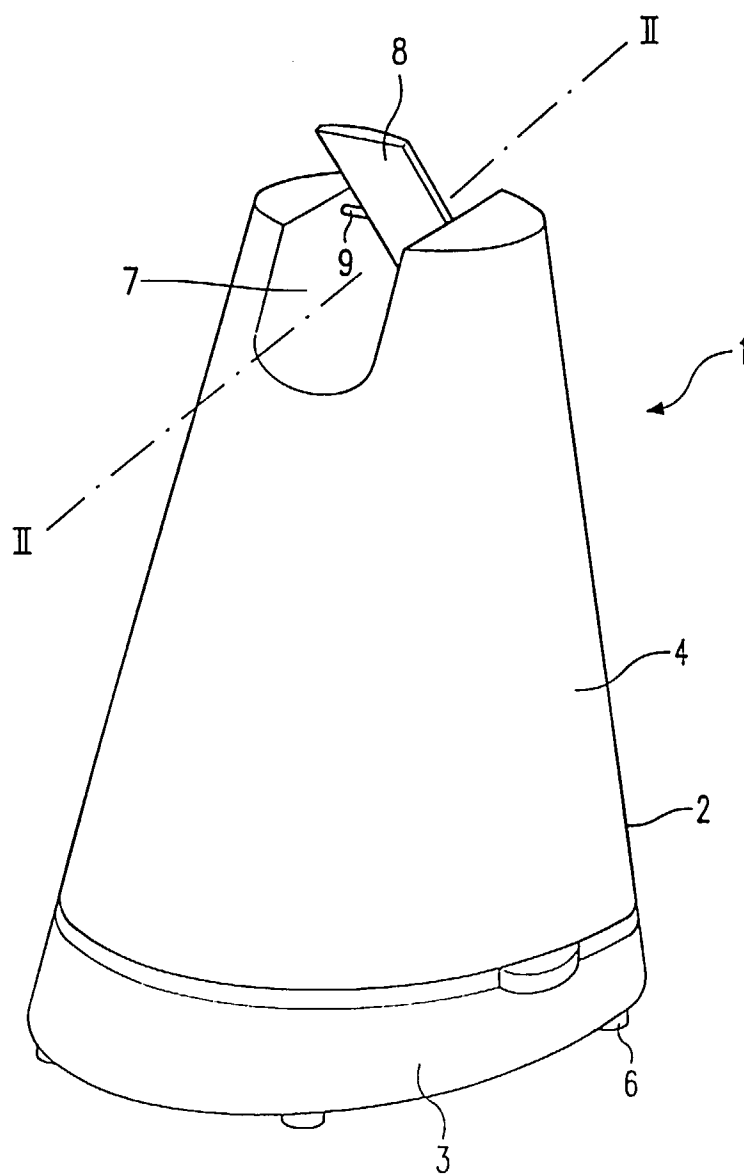


FIG. 1

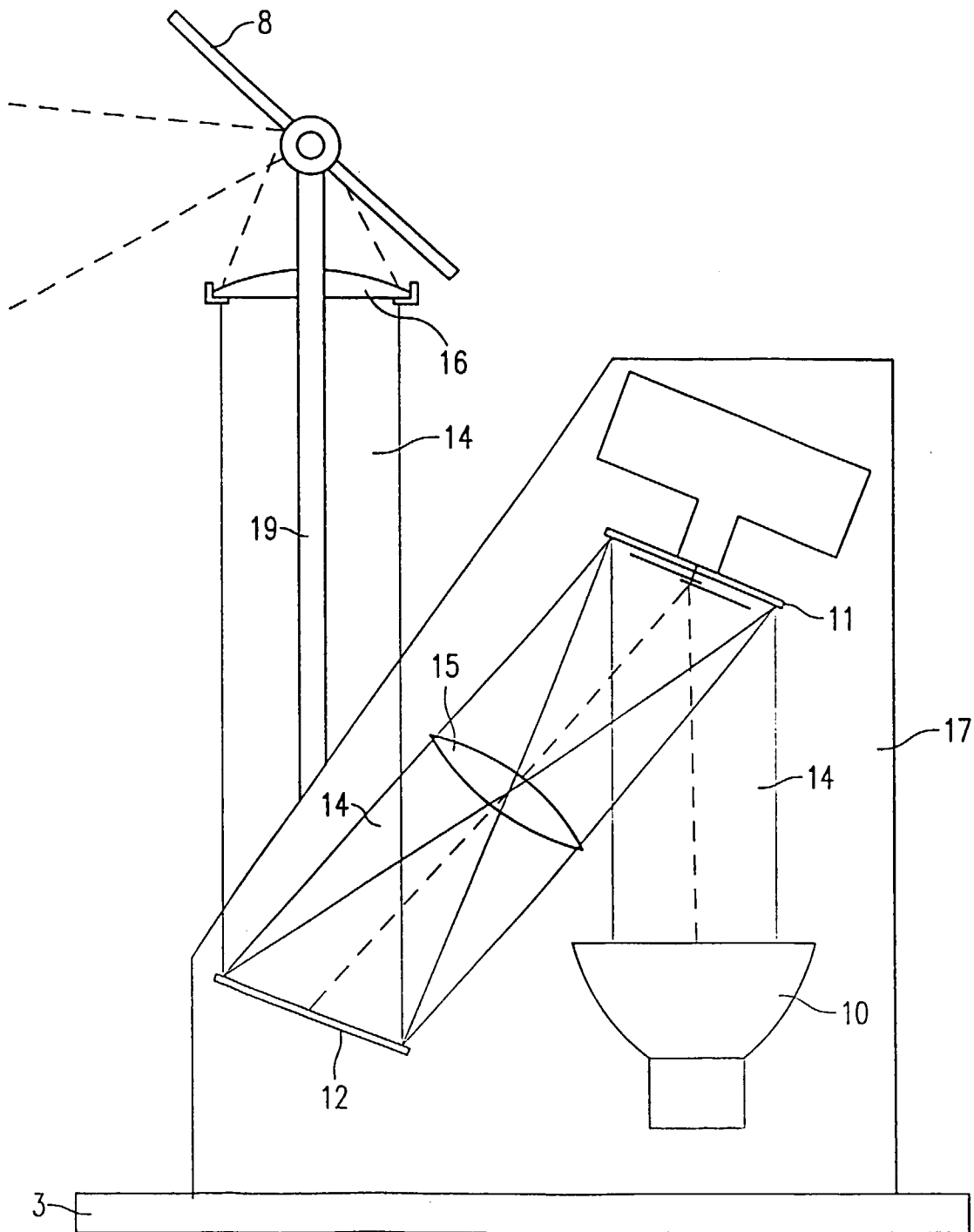


FIG. 2

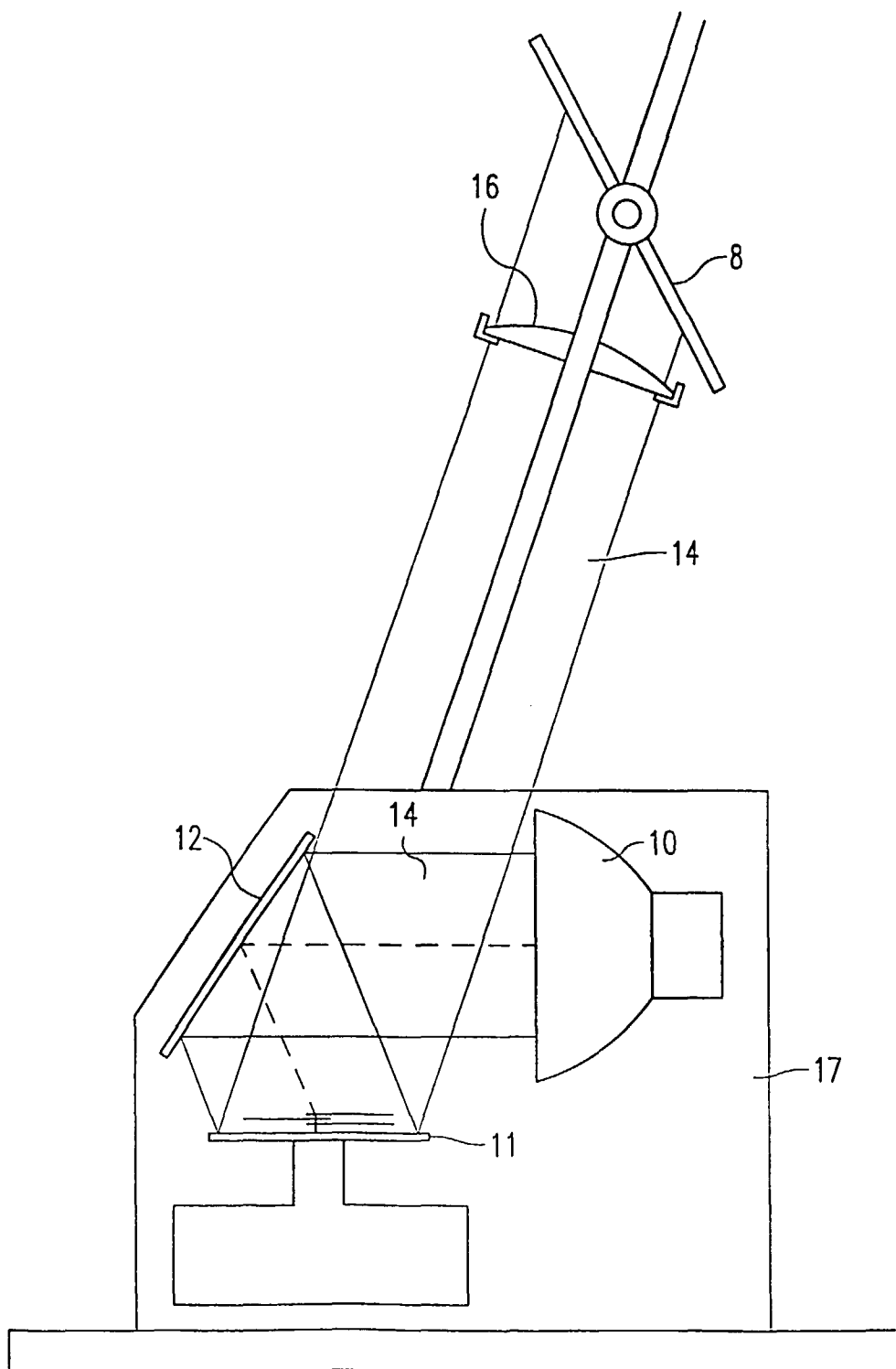


FIG. 3

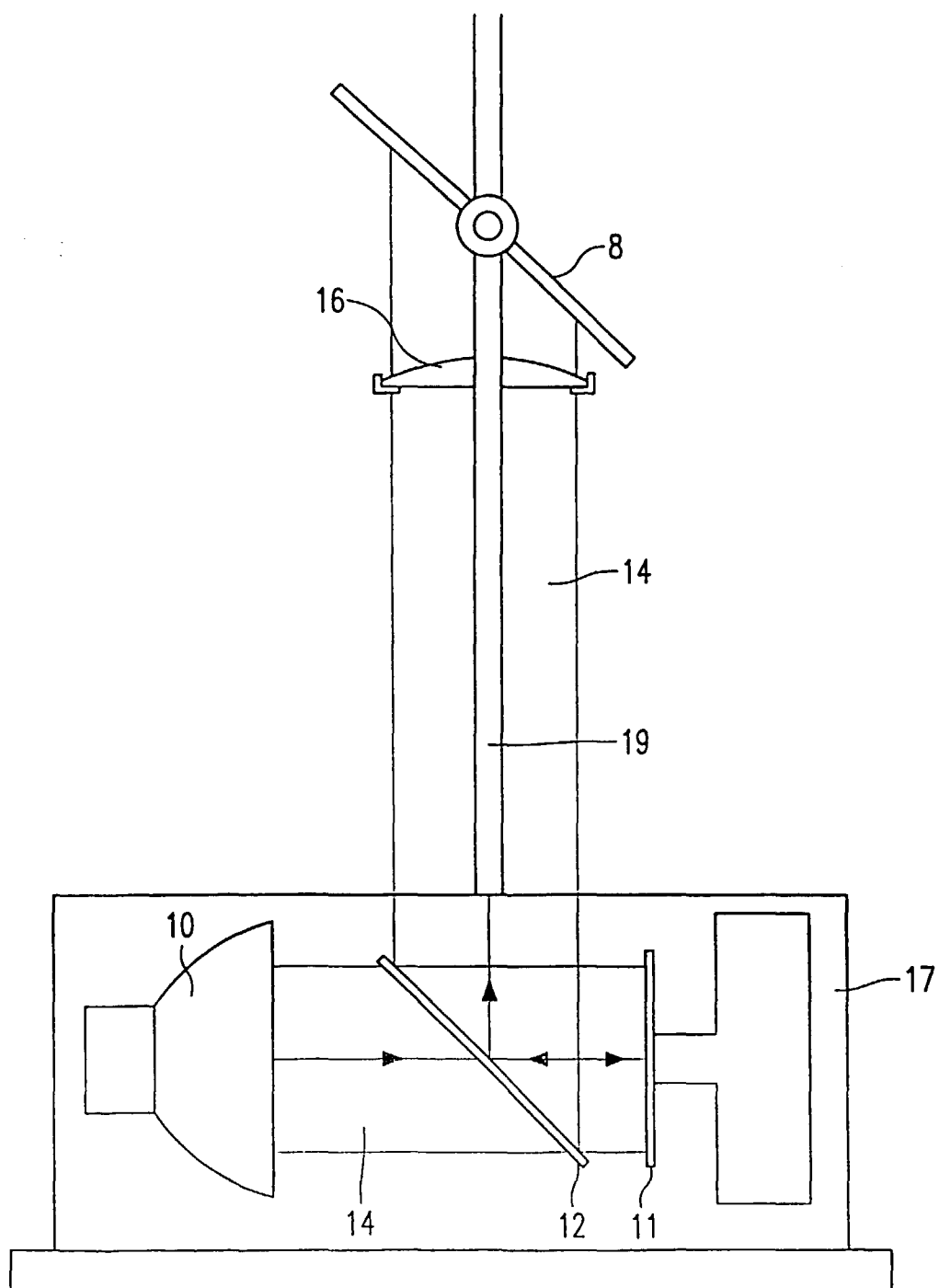


FIG. 4