ABSTRACT: In a street-lighting luminaire operable in response to ambient light levels through a photocontrol mounted on or within the luminaire, the improvement which comprises a baffle mounted in the aperture through which light reaches the photocontrol to limit the angle of incidence of light rays reaching the light-sensitive element of the photocontrol, the baffle being preferably in the form of a honeycomb.
PHOTOCONTROL BAFFLE MOUNTED IN THE LIGHT ENTRANCE APERTURE AND COMPRISING SMALL APERTURES OF SUCH DEPTH AND WIDTH THAT THE ANGLE OF INCIDENCE IS LIMITED TO 35°

BACKGROUND OF THE INVENTION

This invention relates to street-lighting luminaires of the type which are operable automatically in response to ambient light levels sensed by a photocontrol associated with the luminaire and more particularly to a baffle in combination with such a luminaire to limit the angle of incidence of light rays viewed by the light-sensitive element of the photocontrol.

It is a common practice to turn street-lighting luminaires of various sizes and shapes, particularly those employing high-pressure mercury vapor discharge lamps as a light source, on and off by means of a photocontrol. The reason for operating street-lighting luminaires in response to sensed ambient light levels is twofold. First, of course, light is provided by the luminaire when it is needed regardless of the time of day and without regard to human selective control by virtue of the light being turned on in response to a particular level of sensed ambient light. Secondly, high-pressure mercury vapor discharge lamps require a significantly higher current surge to start the lamp than is required to operate the lamp after it is started and therefore if every luminaire in a system is turned on simultaneously the tremendous power drain required to start all of the lamps simultaneously could well cause failure of the system. By employing photocontrol starting of the individual fixtures the lamps are turned on at different times in response to ambient light levels sensed by the separate photocells connected to the individual fixtures and hence the tremendous drain on the power supply which occurs when all lamps are started simultaneously is eliminated. Photocells for street-lighting fixtures have been mounted variously in separate housings on top of the luminaire, as is particularly noticeable in some ovate-type street-lighting luminaires, within the main housing of the luminaire in the compartment generally housing the lamp socket and lamp ballast components, as well as in the pole or support which mounts the luminaire. In all instances a fairly large opening is provided in the housing or support to permit ambient light to reach the light-sensitive element of the photocontrol. One problem which in some instances exists, and which is primarily dependent upon the orientation of the luminaire with respect to other artificial light sources or highly reflective surfaces, is that the photocontrol may see light produced by the lamp with which it is associated or may get light from other artificial sources of illumination such as street lights, automobile headlamps, or from advertising signs. The problem of reflected light can also be enhanced when the ground, adjacent structures or the cover of the luminaire have a snow covering.

SUMMARY OF THE INVENTION

It is an object of the present invention to limit the effect of direct or reflected artificial light on the photocontrol of a street-lighting-type luminaire.

Another object of this invention is to provide, in a street-lighting-type luminaire, operable from a photocontrol means, whereby the effect of reflected and direct artificial light is minimized.

Yet another object of the present invention is to provide baffle means in the light entrance aperture to the photocontrol of a street-lighting luminaire to thereby limit the effect of reflected and direct artificial light on the photocontrol-sensing mechanism.

The foregoing objects and others are accomplished in accordance with the present invention by providing in combination with a luminaire having a support, a housing, a lamp cavity, a photocontrol and a light entrance aperture to the photocontrol; the improvement which comprises baffle means constructed and arranged in the light entrance aperture to limit the angle of incidence of light reaching the photocontrol.

BRIEF DESCRIPTION OF THE DRAWINGS

The above-described objects, and others, along with many of the attendant advantages of the present invention will become more readily apparent and better understood as the following detailed description is considered in connection with the accompanying drawings in which:

FIG. 1 is a side elevational view of a typical post-top-type luminaire having its photocontrol in luminaire housing;

FIG. 2 is a side elevational view of the post and luminaire connection of a luminaire similar to FIG. 1 with a pole or support-mounted photocontrol;

FIG. 3 is a side elevational view of the upper portion of a luminaire similar to that illustrated in FIG. 1 with a separate photocontrol housing mounted on the top thereof;

FIG. 4 is a sectional view taken along the line IV—IV of FIG. 1 with portions thereof broken away; and

FIG. 5 is a front elevational view of a honeycomb-type baffle.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to the drawings wherein like reference characters represent like parts throughout the several views there is illustrated in FIG. 1 a typical post-top-type street-lighting luminaire generally designated 10. The lighting unit 10 is generally mounted at its base through a mounting cellar 12 to an upright post 14. The post-top-type street-lighting luminaire generally includes a housing portion 16 in which the various electrical components are located as for example the lamp socket, the ballast components and in some instances the photocontrol as illustrated at 18. Above the housing section 16 generally is deployed the optical cavity which houses the lamp and is defined by a light transmissive, generally glass or plastic, refractor 20 which may or may not be designed with flutes and prisms to direct the light emanating from the luminaire. Over the lamp cavity is generally disposed a top cover member 22 which may take many different shapes or forms but as illustrated in FIG. 1 is in the form of a "coolee-hat"-type configuration.

In the embodiment illustrated in FIG. 1 the photocontrol 18 is disposed in the luminaire housing portion 16 which has in a sideway thereof an aperture 24 which permits light from the exterior of the luminaire to reach the photocontrol-sensing element.

It has been found with a large aperture 24 of sufficient size to permit enough ambient light to reach the photocontrol-sensing element that there also can reach the photocontrol-sensing element, artificial lighting either direct or reflected. In addition to direct light from various sources, for example, light can be reflected from the cover member 22 onto the photocontrol or from snow covered ground to the photocontrol. Also, light from the luminaire itself may be reflected back from adjacent structures which would in effect cause the lamp in the luminaire to cycle on and off in response to its own light output. It has been found that the problems of reflected light beams as well as those created by direct light beams coming from various angles can be substantially reduced by placing in the aperture 24 a light baffle 26 which will substantially reduce the angle of incidence which can be traversed by a beam of light and still permit that beam of light to reach the photocontrol-sensing element. The baffle 26 is preferably in the form of a honeycomb, the cells of which can take many different forms such as for example rectangular, square, triangular or preferably, as illustrated in FIG. 5, a true honeycomb shape defined by a plurality of hexagons. The baffle 26 is of course, preferably constructed from a material which has, or is finished in, a dull nonreflective surface in order to absorb light impacting thereon.

As can be readily seen from FIG. 4, the honeycomb baffle 26 will eliminate light beams such as those illustrated at 28 which have a high angle of incidence while admitting light beams or rays having a low angle of incidence such as those identified at 30. The angle of incidence of admitted light can of course be controlled by varying the depth d of the baffle cell.
walls or the width \( w \) of the individual cells. Increasing the depth \( d \) or decreasing the width \( w \) will decrease the angle of incidence of admitted light and vice versa. Also affecting the angle of incidence of admitted light is the distance \( x \) between the baffle 26 and the photocontrol-sensing element. The maximum angle of incidence of admitted light is of course controlled by the dimensions \( d \) and \( w \) but that angle can be reduced by moving the baffle away from the photocontrol-sensing element or in other words by increasing the dimension \( x \). The baffle 26 may be placed right on the face of the photocontrol-sensing element to thus eliminate any possible effect of the distance \( x \) on the angle of incidence of light reaching the sensing element.

As a specific example a honeycomb baffle of the hexagonal configuration illustrated in FIG. 5 having a dimension \( d \) of one-fourth inch and a mean diameter \( w \) of three-sixteenths of an inch will limit the angle of incidence of rays capable of reaching the photocontrol-sensing element, assuming \( x \) to be negligible, to 35° or the equivalent of a 70° arc.

In some instances the photocontrol 18 may be mounted in the post to which the luminaire 10 is affixed as illustrated in FIG. 2. Mounting the photocell in a lower position as for example in the pole subjects the photocontrol in some instances to headlight beams from passing automobiles and other lower level forms of illumination. In this embodiment mounting of the baffle 26 in the light entrance aperture 24 in the pole 14 will also serve effectively to limit artificial light beams from affecting the photocontrols response to ambient light conditions.

Referring now to FIG. 3, there is illustrated another embodiment of the present invention. In some instances it is desirable to situate the photocontrol in a separate housing atop the luminaire. In the embodiment of FIG. 3 a separate photocontrol housing 32 is secured to the top of the luminaire cover member 22. Situated within the photocontrol housing 32 is a conventional photocontrol 16 with its sensing element adjacent window 24 in housing 32. A baffle 26 similar to that described with respect to FIGS. 1 and 2 is located within the opening 24 in order to reduce the angle of incidence of light beams which may fall on the light-sensitive element of photocontrol 18. In this embodiment as will be readily apparent artificial illumination mounted above the luminaire 10 could well reflect off cover member 22 onto the photocontrol-sensing means as well as directly impinging on the photocontrol-sensing member. Baffle 26 in the aperture 24 substantially reduces the angle of incidence at which light beams may affect the operation of this top-mounted photocontrol.

Although the invention has been described with respect to illustrations of a post-top-type luminaire it should be readily apparent that the invention is equally applicable to the ovate-type street-lighting luminaire in which the photocontrol may be mounted within the elongated housing similar to the FIG. 1 embodiment where the photocontrol is mounted on top of the luminaire in a separate housing similar to the illustration of FIG. 3. Although it is less likely that the present invention would be necessary in the ovate-type luminaire which is generally mounted at a much higher level than the post-top-type luminaire illustrated, it is quite conceivable that in a city situation where the ovate-type luminaire is surrounded by high buildings and illuminated advertising signs that the baffle of the present invention could be quite necessary.

What is claimed is:

1. In combination with a luminaire having a post, an opaque housing portion mounted on said post, an optical cavity above said housing portion defined by a light-transmissive refractor, a top cover member above the lamp cavity, a photocontrol having a light-sensitive element and a light entrance aperture in said housing adjacent to and spaced from said photocontrol, the improvement comprising, baffle means mounted in said light entrance aperture limiting the angle of incidence of light reaching said light-sensitive element of said photocontrol, said baffle means comprising a plurality of small apertures having a depth \( d \) and a mean diameter \( w \), said depth \( d \) and said mean diameter \( w \) bearing such relationship that the maximum angle of incidence of light rays capable of reaching the light-sensitive element of said photocontrol is not greater than 35°.

2. The combination as specified in claim 1 wherein said plurality of small apertures are hexagonal in cross section.