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(54) IMPROVEMENTS IN ADJUSTABLE STREET AND/OR AREA LIGHTING UNITS

(71) We, PHOSCO LIMITED of Hoe Lane, Ware, Hertfordshire, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to electric lighting units for street and/or area lighting in which a well defined area is lit by beams of light from the lighting unit.

In order to obtain efficient utilization of light from a lighting unit it is common practice to employ optical control devices to restrict or magnify light emissions in desired directions. When lighting an area of a particular size and shape the optimum light distribution can be obtained if this restriction or magnification of light is correctly accounted for when the lighting unit is designed. However, the majority of installations have differing requirements which can only be met by a given lighting unit if the latter is constructed to be adjustable. Many lighting units, especially of the high-mast kind, contain a plurality of individual lamp units, each having a reflector. It is known for the lamp units to be independently adjustable to meet the above differing requirements, but such lamp units do not give great flexibility of adjustment because the reflectors are fixed relative to the lamp units.

Also known in the prior art is a lamp unit embodying a lamp, which acts as a light source, and one or more movable reflectors, each of which is so formed as to redirect light received from the lamp in a beam of magnified intensity. The reflector or reflectors can be individually rotated about an axis through the lamp and each reflector can be set in a position so that its beam is emitted from the lamp unit in a desired direction even though the lamp unit is not redirected. What has been stated of a beam from one reflector is also true of a composite beam from a plurality of reflectors in the same unit.

Such a lamp unit will hereinafter be referred

to as the kind described, and an example of this kind is shown in Patent Specification No. 625,307.

According to the present invention there is provided an adjustable street and/or area lighting unit including two or more individual lamp units of the kind described which are arranged to provide a combined distribution of light on the street or area. Adjustment of a reflector or reflectors of one or more of the lamp units in order to vary respectively one or more of the beams or composite beams of light produced by the lamp unit or units thus causes a variation of the combined distribution.

Preferably the individual lamp units are independently rotatable about respective axes through the lamps, in order that the directions of the individual beams or composite beams can be varied to further vary the combined distribution of light.

The lamp units may be supported from a mast, means being provided for lowering the arrangement of lamp units down the mast if necessary.

The lighting unit may include remote-control gear for adjusting the reflector or reflectors of the individual lamp units from a location remote from the arrangement of lamp units.

The present invention will now be described in greater detail by way of example with reference to the accompanying drawings, wherein:—

Figure 1 is a perspective view of one form of lighting unit consisting of lamp units arranged at the top of a high mast;

Figure 2 is an elevation, partly in section, of the lighting unit shown in Figure 1;

Figure 3 is a schematic layout of one situation in which the lighting unit would have application; and

Figure 4 is a plan view of an alternative form of part of the lighting unit shown in Figure 2.

Referring to Figures 1 and 2, a high mast 1 supports a canopy 2 which is fixed to the

mast 1. Eight individual lamp units 3 are arranged on a circular rail 4 beneath the canopy.

Referring to Figure 2, a means for lowering the arrangement of lamp units 3 (to the ground if necessary) is shown as a system of pulleys 5 with associated cables 6. In the example there are four pulleys 5 so as to keep the rail 4 stable when it is being lowered.

The lamp units 3 are provided with pivotal mountings 8 on the rail 4 so that they are pivotable about the rail 4 so that they can be slightly inclined with respect to a vertical axis.

The lamp units 3 can be moved around the circle described by the rail 4 and fixed at any point along the rail, provision being made for detaching lamp units from the rail 4 or for adding lamp units to the arrangement. The lamp units have rotatable mountings 9 for coupling them to supporting struts 7 so as to be rotatable about the longitudinal axes of their respective supporting struts 7, which are also the axes through the respective lamps. Thus by using lamp units of the kind described, particularly if the positions of the reflector or reflectors has been pre-set, a desired composite distribution of light can be obtained by adjusting the number, relative position and attitude in space of the lamp units.

If it is desired to alter the light intensity distribution after installation of the lighting unit, then the whole arrangement is lowered, by means of the pulley system, to the ground, whereby the relative positions of the lamp units and/or the reflectors are easily adjusted as described above.

Referring to Figure 3, by way of illustration only, there is shown one situation, namely, a flyover, where four lighting units L, constructed as described above, are used. The broken lines corresponding to each of the lighting units L indicate one shape of the light distribution of the lamp units of the lighting unit, the shape being approximately that of an ellipse having its centre non-coincident with the lighting unit L. If it were thought necessary to alter the light distributions of the four lighting units L such as to illuminate the junctions J and slip roads S more effectively, then the lamp units could be altered to give the chain-dotted line light distributions. Each of these latter distributions is, in this example, of a similar shape to the former distribution corresponding to the same lighting unit L, but of a different size therefrom.

It may be that in extreme cases of the type just mentioned it would be simpler and more efficient if remote-control gear was installed in the lighting units. Thus adjustment of the light distribution could be carried out from the bottom of the mast. In this way, the changing light distribution could be observed and a more accurate and swifter adjustment of the light distribution be obtained.

A further modification is in the possibility

of having more than one circular rail carrying lamp units. A second rail, for example, could be independent of the first thereby necessitating two pulley systems or it could be formed as part of the same structure so that only one pulley system is required.

Variations in the rail system can obviously be used such as, for example, referring to Figure 4, a number of spoke-rails 10 extending from a central hub 11 could replace the rail 4 or supplement it. Thus as well as the previous possible adjustments and securing of the lamp units' position on the rail, the lamp units' attitude in space and rotation of the lamp unit about an axis through the light source, the spoke-rails could be arranged on the hub so as to be partially independent of one another in their horizontal rotation about the hub. Clearly if the spoke-rails 10 lie in the same horizontal level they cannot pass one another when moving around the hub but this in general will not be necessary. If, however, a need for such versatility did arise then it is clearly possible to have the spoke-rails arranged on different horizontal levels.

In an alternative arrangement, the spoke-rails 10 may be secured to the top of the mast by means of the hub 11.

The type of lamp unit used may take many forms provided that it includes the feature of the individual moving reflectors in accordance with the type described referred to above, the one which is used depending on the purpose and situation for which the lighting unit is intended.

It is clear that different ways of keeping the lighting unit in good condition by preventing ingress of dirt and moisture may be adopted. For example, the lamp units may be individually sealed with cover glasses and the canopy left open or the canopy itself may be sealed on its underside by a transparent cover.

Provision may also be made for the whole arrangement of lamp units to tilt slightly about the top of the mast so as to give further adjustment.

Thus the lighting unit described above provides a versatile, easily adjustable means of illumination whose construction can be very simple and inexpensive. It is because of this versatility and easy adjustment that the lighting unit described above can produce a great saving in situations where previously much time, money and manpower would be required to design, construct and set up a suitable illumination system. The present invention provides a series of standardized lighting units which can be adapted so as to satisfy the majority of requirements in the field of street and/or area lighting.

WHAT WE CLAIM IS:—

1. An adjustable street and/or area lighting unit including two or more individual lamp units of the kind described which are arranged

mast 1. Eight individual lamp units 3 are arranged on a circular rail 4 beneath the canopy.

Referring to Figure 2, a means for lowering the arrangement of lamp units 3 (to the ground if necessary) is shown as a system of pulleys 5 with associated cables 6. In the example there are four pulleys 5 so as to keep the rail 4 stable when it is being lowered.

The lamp units 3 are provided with pivotal mountings 8 on the rail 4 so that they are pivotable about the rail 4 so that they can be slightly inclined with respect to a vertical axis.

The lamp units 3 can be moved around the circle described by the rail 4 and fixed at any point along the rail, provision being made for detaching lamp units from the rail 4 or for adding lamp units to the arrangement. The lamp units have rotatable mountings 9 for coupling them to supporting struts 7 so as to be rotatable about the longitudinal axes of their respective supporting struts 7, which are also the axes through the respective lamps. Thus by using lamp units of the kind described, particularly if the positions of the reflector or reflectors has been pre-set, a desired composite distribution of light can be obtained by adjusting the number, relative position and attitude in space of the lamp units.

If it is desired to alter the light intensity distribution after installation of the lighting unit, then the whole arrangement is lowered, by means of the pulley system, to the ground, whereby the relative positions of the lamp units and/or the reflectors are easily adjusted as described above.

Referring to Figure 3, by way of illustration only, there is shown one situation, namely, a flyover, where four lighting units L, constructed as described above, are used. The broken lines corresponding to each of the lighting units L indicate one shape of the light distribution of the lamp units of the lighting unit, the shape being approximately that of an ellipse having its centre non-coincident with the lighting unit L. If it were thought necessary to alter the light distributions of the four lighting units L such as to illuminate the junctions J and slip roads S more effectively, then the lamp units could be altered to give the chain-dotted line light distributions. Each of these latter distributions is, in this example, of a similar shape to the former distribution corresponding to the same lighting unit L, but of a different size therefrom.

It may be that in extreme cases of the type just mentioned it would be simpler and more efficient if remote-control gear was installed in the lighting units. Thus adjustment of the light distribution could be carried out from the bottom of the mast. In this way, the changing light distribution could be observed and a more accurate and swifter adjustment of the light distribution be obtained.

A further modification is in the possibility

of having more than one circular rail carrying lamp units. A second rail, for example, could be independent of the first thereby necessitating two pulley systems or it could be formed as part of the same structure so that only one pulley system is required.

Variations in the rail system can obviously be used such as, for example, referring to Figure 4, a number of spoke-rails 10 extending from a central hub 11 could replace the rail 4 or supplement it. Thus as well as the previous possible adjustments and securing of the lamp units' position on the rail, the lamp units' attitude in space and rotation of the lamp unit about an axis through the light source, the spoke-rails could be arranged on the hub so as to be partially independent of one another in their horizontal rotation about the hub. Clearly if the spoke-rails 10 lie in the same horizontal level they cannot pass one another when moving around the hub but this in general will not be necessary. If, however, a need for such versatility did arise then it is clearly possible to have the spoke-rails arranged on different horizontal levels.

In an alternative arrangement, the spoke-rails 10 may be secured to the top of the mast by means of the hub 11.

The type of lamp unit used may take many forms provided that it includes the feature of the individual moving reflectors in accordance with the type described referred to above, the one which is used depending on the purpose and situation for which the lighting unit is intended.

It is clear that different ways of keeping the lighting unit in good condition by preventing ingress of dirt and moisture may be adopted. For example, the lamp units may be individually sealed with cover glasses and the canopy left open or the canopy itself may be sealed on its underside by a transparent cover.

Provision may also be made for the whole arrangement of lamp units to tilt slightly about the top of the mast so as to give further adjustment.

Thus the lighting unit described above provides a versatile, easily adjustable means of illumination whose construction can be very simple and inexpensive. It is because of this versatility and easy adjustment that the lighting unit described above can produce a great saving in situations where previously much time, money and manpower would be required to design, construct and set up a suitable illumination system. The present invention provides a series of standardized lighting units which can be adapted so as to satisfy the majority of requirements in the field of street and/or area lighting.

WHAT WE CLAIM IS:—

1. An adjustable street and/or area lighting unit including two or more individual lamp units of the kind described which are arranged



- to provide a combined distribution of light on the street or area.
2. A lighting unit according to claim 1, wherein the individual lamp units are independently rotatable about respective axes through the lamps, in order that the directions of the individual beams or composite beams of the light produced by the lamp unit or units can be varied in order to vary further the combined distribution of light.
3. A lighting unit according to claim 1 or 2, including a mast for supporting the lamp units.
4. A lighting unit according to claims 3, wherein means are provided for lowering the arrangement of lamp units down the mast.
5. A lighting unit according to any one of the preceding claims 2 to 4, further including one or more rails on which the lamp units are mounted so as to be pivotable about the rail or the respective rails so that they can be inclined with respect to a vertical axis.
6. A lighting unit according to claim 5, wherein the lamp units are also movable along the rails.
7. A lighting unit according to claim 5 or 6, including a substantially vertical supporting strut for each lamp unit, by which struts the lamp units depend from the rail or rails, the lamp units being rotatable about the longitudinal axes of the respective supporting struts.
8. A lighting unit according to any one of claims 5 to 7, as appendant to claim 3, wherein the one or more rails are circular and encircle the mast from which the rails are suspended by means of a system of ropes and pulleys.
9. A lighting unit according to any one of claims 5 to 7, as appendant to claim 3, wherein the one or more rails are arranged as spokes projecting from a central hub which is supported by means of the mast.
10. A lighting unit according to any one of the preceding claims, including remote-control gear for adjusting the reflector or reflectors of the individual lamp units from a location remote from the arrangement of lamp units.
11. An adjustable street and/or area lighting unit constructed substantially as herein described with reference to and as illustrated in the accompanying drawings.
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