VEHICLE GUIDANCE AND PROXIMITY WARNING SYSTEM

The headlights of a vehicle (20), successively illuminating a series of light receivers (13) fixed relative to a road (10), cause a series of light emitters (15) also fixed relative to said road (10) to successively light up, ahead of the vehicle (20) to act as a guide thereto, e.g. on curves, or behind the vehicle (20) to warn following traffic of the vehicle’s presence, in conditions of poor visibility. Light (21) impinging on the receivers (13) is transmitted along fibre optic cables (14), preferably directly to the emitters (15); alternatively said light (21) may activate roadside light sources to illuminate the emitters (15) via fibre optic cables (14). Light receiver (13) and light emitter (15) may be housed in a common unit (11), e.g. a road surface marker block (12) including a conventional reflex reflector (16) and depressible into the surfacing.
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VEHICLE GUIDANCE AND PROXIMITY WARNING SYSTEM

The present invention relates to vehicle guidance and proximity warning systems for use, particularly, on vehicle trackways such as motorways and similar roads.

Motorways and similar roads are generally considered to be the safest form of roads. However, accidents which do occur thereon typically involve a plurality of vehicles. Serious accidents involving many vehicles are most likely to occur in foggy conditions. In foggy conditions, even with modern increased intensity rear lighting systems, drivers often become aware of traffic ahead of them at a time when they are closing on that traffic at a speed too great to allow a collision to be avoided. A possible contributory factor towards excessive speeds is that in foggy conditions motorways provide very few visual references to give a driver a subjective impression of speed under conditions when the diversion of attention from outside a vehicle to the instruments is inadvisable.

There is, therefore, a need in conditions of poor visibility for some indication to a driver of a vehicle of the presence ahead of him of other vehicular traffic. Systems involving the fitting of radar sets to vehicles have been proposed, but have not, as far as the Applicant is aware, ever been fitted on a production basis.

There is also a continuing requirement for the improvement of vehicle guidance systems. Many sections of roadway do not carry sufficient traffic density to merit full artificial lighting in hours of darkness. A well-known method of assisting drivers of vehicles on such sections involves use of the devices known as "cat's eyes". These are very effective, but operate by reflecting incident light and can only therefore be seen by a driver when light from his headlights impinges thereon. They are, therefore, not very effective on curves.

According to the present invention a vehicle guidance or proximity warning system includes at least one series of light receivers and at least one series of light transmitters, both series being fixed relative to a vehicle trackway, in which each receiver is arranged to react to light from a vehicle headlight such as to cause at least one transmitter spaced apart from the receiver to transmit light.
Each series is preferably embedded in a road surface parallel to a road centre line, and preferably form a single line. Alternatively one or both series can be positioned at the side of a road.

As used for a guidance system transmitters forward of a direction of vehicle motion are caused to transmit light.

As used for a vehicle proximity warning system transmitters rearward of a direction of vehicle motion are caused to transmit light, and in this case light transmitters are preferably adapted to transmit light in the red spectrum range.

In one embodiment of the invention a light receiver and a light transmitter are housed in a common unit, preferably of the "cats eyes", type which can advantageously also house a conventional "cats eye" reflector.

In a preferred embodiment of the invention each light receiver is connected by a fibre optic cable to a single light transmitter. Alternatively each light receiver may communicate with an actuator whereby light from a powered light source is supplied to an associated transmitter. In embodiments such as this powered light units are preferably sited at the side of the roadway with light being communicated thereto and therefrom via fibre optic cables.

One embodiment of the invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawings, of which:

Figure 1 is an elevation, partly in section, of a road fitted with a vehicle proximity warning system according to the invention.

Figure 2 is a perspective view of a light unit as used in Figure 1, and

Figures 3 and 4 are details of the unit shown in Figure 2.

A road 10 (Figure 1) has embedded in its surface a plurality of units such as those shown at 11. Each unit 11 (Figure 2) comprises a housing in the form of a block 12 of rubber or similar material which is adapted to retract into the road surface (in a manner well-known in the art) when contacted by a wheel of a vehicle. Partially enclosed in the block 12 are a receiving lens 13 and a transmitting lens 15 connected to fibre optic cables 14, and a reflector 16.
Between the transmitting lens 15 and fibre optic cable 14 is interposed a red filter 17 (Figure 3) whilst the receiver 13 is connected directly to the fibre optic cable 14 (Figure 4). The fibre optic cable 14 of each receiving lens 13 is connected (Figure 1) to the transmitting lens 15 of a rearward (relative to intended direction of vehicle flow along the road 10) unit 11.

In use, as a vehicle 20 moves along the road 10 with headlights 21 illuminated, light falls on the receiving lenses 13 of successive units 11 and is transferred along fibre optic cables 14 to associated transmitting lenses 15 of rearward units 11. This transmitted red light which can be seen by a driver of a following vehicle giving him advance warning of the presence ahead of vehicle 20.

It will be appreciated that the embodiment of the invention described above with reference to Figures 1 to 4 is a completely passive system which required no external power input other than that provided by vehicles themselves. The system therefore requires minimal maintenance, as the fibre optic cable 14 can be embedded in the road surface during construction of the road. Alternatively of course a system can be installed retrospectively as a part of a road work programme.

It will be realised that many alternative embodiments of the invention are possible. For example in certain circumstances it might be desirable to have the ability to transmit light of a higher intensity than that provided by the present system. An alternative system therefore might have light transmitted from a receiving lens 13 to a slave unit (not shown) situated preferably at the side of the road whence light provided by a conventional light unit can be transmitted directly or by fibre optic cable to a transmitting lens 15.

Many possible different units such as those illustrated at 11 are possible within the scope of the invention. For example whereas receiving lens 13, transmitting lens 15, and reflector 16 are illustrated as enclosed in a single unit they might, in some cases, be housed in separate units.

It will be readily apparent how the invention as described above with reference to Figure 1 can be adapted to provide a vehicle guidance system with transmitting lenses 15 forward (relative to a direction of vehicle motion) of receiving lenses 13 being activated.
The invention can also be used to provide both a guidance system and a proximity warning system in which, preferably, each receiving lens is connected to at least one forwardly positioned and at least one rearwardly positioned transmitting lens.

As an alternative to being embedded in the road surface receivers, transmitters or both can be situated at the side of a road.
CLAIMS

What is claimed is:

1) A vehicle guidance or proximity warning system including at least one series of light receivers (11, 13) and at least one series of light transmitters (11, 15), both series being fixed relative to a vehicle trackway, characterised in that each receiver (11, 13) is arranged to react to light from a vehicle (20) headlight such as to cause at least one transmitter (11, 15) spaced apart from the receiver (11, 13) to transmit light.

2) A system as claimed in Claim 1 characterised in that each series is embedded in a road surface.

3) A system is claimed in Claimed 2 characterised in that each series extends parallel to a road centre-line.

4) A system as claimed in Claim 1 characterised in that light receivers (11, 13) light transmitters (11, 15) or both are positioned at a side of a road.

5) A system as claimed in any one of Claims 1 to 4 characterised in that transmitters (11, 15) rearward, relative to a direction of vehicle (20) motion, of receivers (11, 13) are caused to transmit light.

6) A system as claimed in any one of Claims 1 to 5 characterised in that transmitters (11, 15) forward, relative to a direction of vehicle (20) motion, of receivers (11, 13) are caused to transmit light.

7) A system is claimed in any one of Claims 1 to 5 characterised in that each light transmitter (11, 15) is adapted to transmit light of a warning colour.

8) A system as claimed in Claim 7 characterised in that the warning colour is red.

9) A system as claimed in any one Claims 1 to 8 characterised in having housing units (12) of the "cats eye" type.

10) A system as claimed in Claim 9 characterised in that each housing (12) includes a light receiver (13) and a light transmitter (15).

11) A system as claimed in Claim 10 characterised in that each housing (12) also includes a reflector (16).

12) A system as claimed in any one of Claims 1 to 11 characterised in that light is transmitted from each light receiver (13) to at least one light transmitter (15) by means of a fibre optic cable (14).
13) A system as claimed in any one of Claims 1 to 11 characterised in that light is transmitted from each light receiver (13) by a fibre optic cable (14) to a slave unit having a powered light source in a light transmitter (15).

14) A system as claimed in any one of Claims 1 to 11 characterised in that light is transmitted from each light receiver (13) by a fibre optic cable (14) to a slave unit having a powered light source from which light is transmitted by a fibre optic cable (14) to a light transmitter (15).

15) A vehicle proximity warning system substantially as herein described.

16) A vehicle guidance system substantially as herein described.

17) A vehicle proximity warning system substantially as herein described with reference to Figures 1 to 4 of the accompanying drawings.

18) A housing unit (11) substantially as herein described for use with a system as claimed in any one of Claims 1 to 16.

19) A housing unit (11) substantially as herein described with reference to Figures 2 to 4 of the accompanying drawings, for use with a system as claimed in any one of Claims 1 to 16.
INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 87/00224

I. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC: C 08 G 1/09; E 01 F 9/06; F 21 V 8/00; C 08 G 1/16

II. FIELDS SEARCHED

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Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched

III. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>CH, A, 588748 (BOSSUGE) 15 June 1977 see column 1, lines 1-3,7,16-32-53, 60-64; column 2, lines 1-9; figures 1,3</td>
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IV. CERTIFICATION

Date of the Actual Completion of the International Search
3rd November 1987

Date of Mailing of this International Search Report

International Searching Authority
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