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**B60Q 1/44 , G01P 1/08**

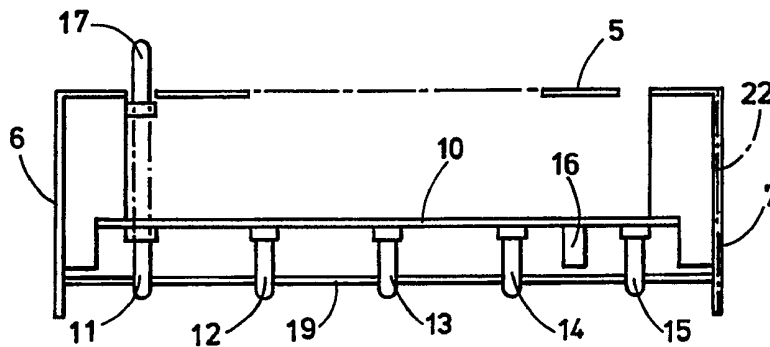
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**GB 2239521 A EP 0299933 A US 5148147 A**  
**US 4890091 A**

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(54) **Signalling apparatus for road vehicles**

(57) Signalling apparatus for road vehicles comprises a self-contained unit adapted to be mounted at the rear of a vehicle. The unit includes a sensor device (16) at least responsive to the deceleration of the vehicle and independent of operation of a brake pedal, and a lighting device (11 - 15) independent of the lights of the vehicle and visible to following vehicles. The lighting device (11 - 15) is adapted to be illuminated to emit a warning signal by means of an electric current supplied to the device through an electrical circuit under the control of the sensor device, and the electrical circuit incorporates a control device for supplying intermittent pulses to the lighting device (11 - 15) to cause the light means to emit a flashing signal.



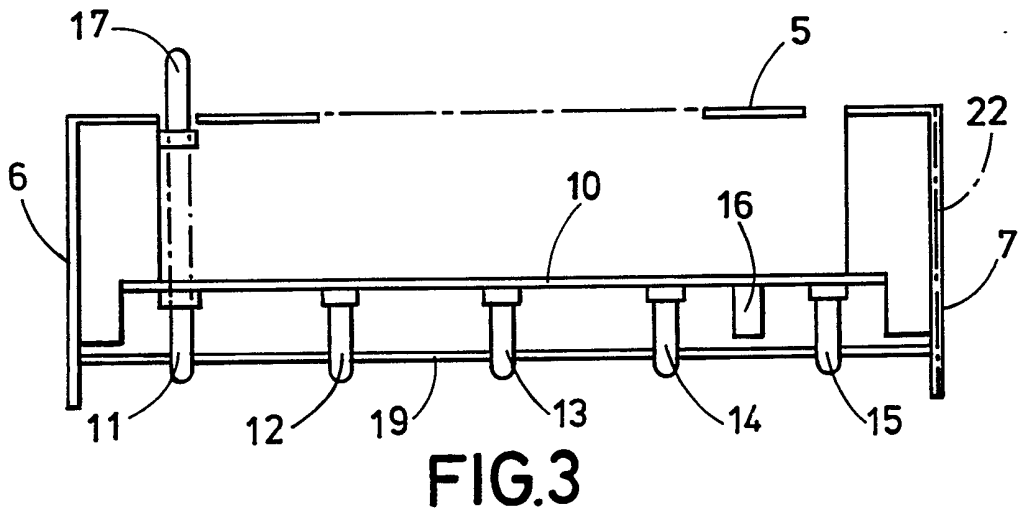
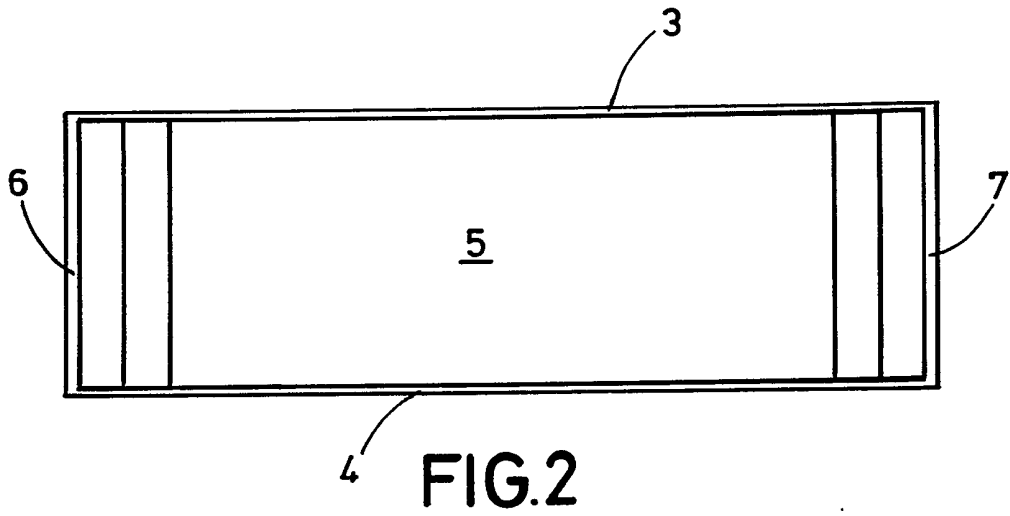
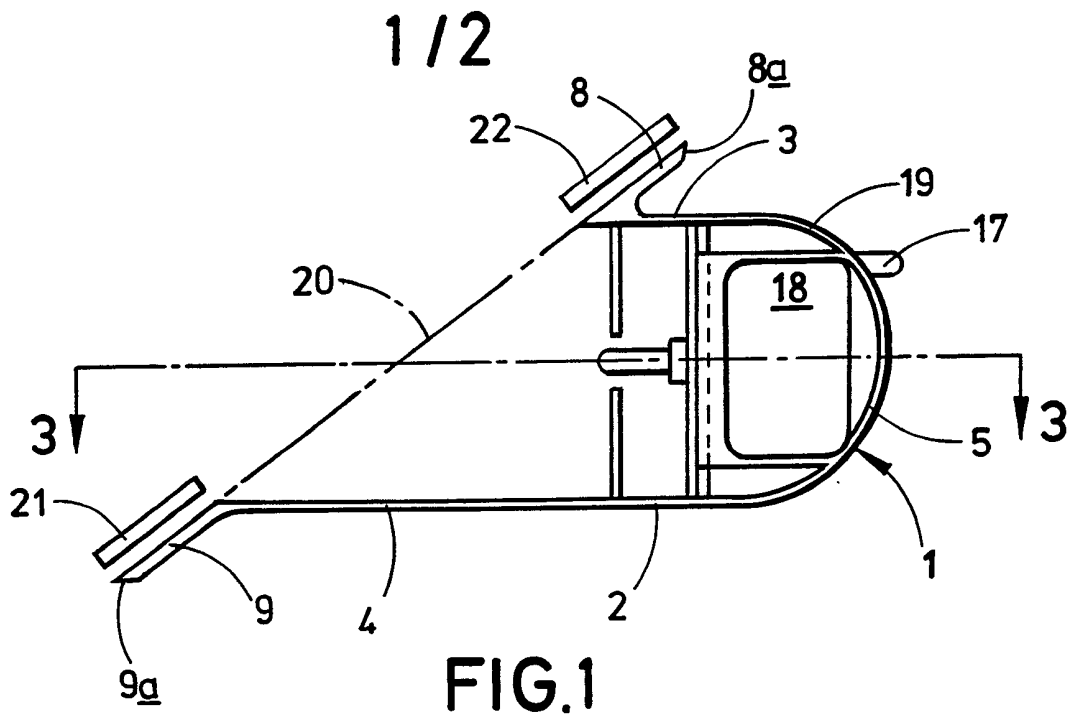
**FIG.3**

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1990.

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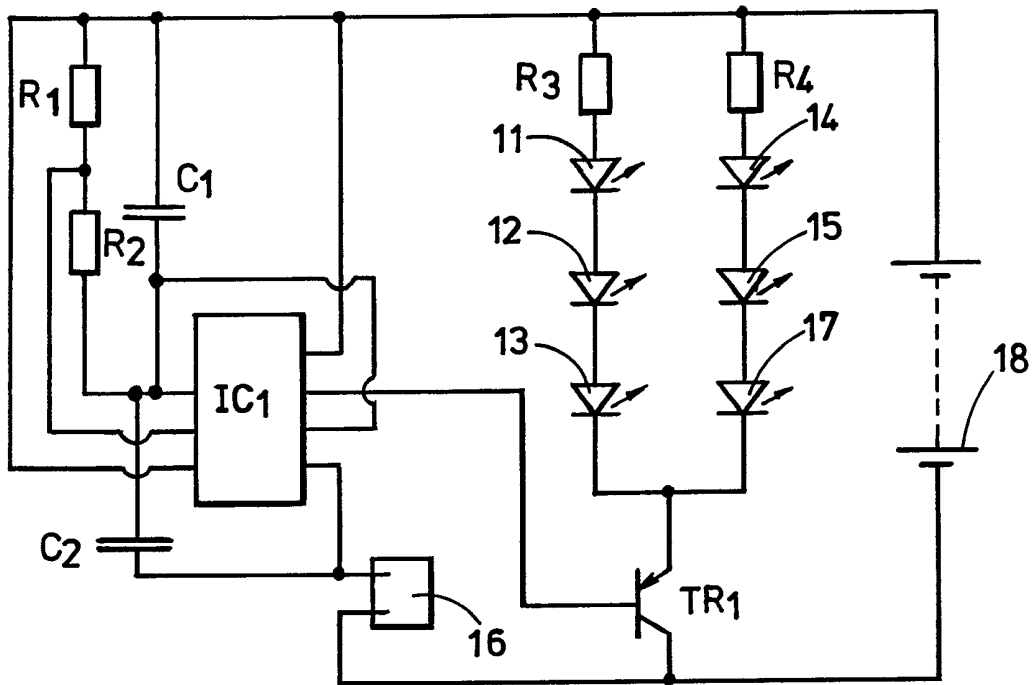


FIG.4

IMPROVEMENTS IN SIGNALLING APPARATUS  
FOR ROAD VEHICLES

This invention relates to improvements in signalling apparatus for road vehicles.

Currently vehicle brake lights simply indicate the fact that the brake pedal has been actuated, and do not indicate the rate of deceleration of the vehicle. This has the disadvantage that it is difficult for a driver of a vehicle to tell how hard the vehicle in front is being braked and, in consequence, for the driver to receive any indication of the rate of deceleration and therefore what effective braking distance is available to him. This often leads to accidents, particularly on motorways. There have been proposals for indicating variations in deceleration by varying the intensity or area of brake lights, in response to excessive deceleration or brake pressure, but these systems depend for their operation on the operation of the normal braking system. Also modification of at least the existing electrical circuitry is necessary for the installation of such systems. This, in turn, is expensive and requires the use of skilled labour.

According to my invention signalling apparatus for road vehicles comprises a self-contained unit adapted to be mounted at the rear of a vehicle, the unit including sensor means at least responsive to the deceleration of the vehicle and independent of operation of a brake pedal, and light means independent of the lights of the vehicle and visible to following vehicles, the light means being adapted to be illuminated to emit a warning signal by means of an electric current supplied to the light means under the control of the sensor means.

The sensor means is adapted to energise the light means to achieve illumination when the rate of deceleration of the vehicle exceeds a predetermined value. Thus the driver of a following vehicle is given an instant and automatic warning of rapid deceleration of a vehicle ahead.

The sensor means may also be responsive to the attitude of the vehicle. This has the advantage that should the vehicle be involved in an accident or for any other reason become out of control and come to rest in an abnormal attitude the apparatus will continue to emit its warning signal, thereby facilitating rescue in remote situations.

Since the apparatus comprises a self-contained unit it can be fitted to the vehicle simply and without any adaptation and without the use of special tools.

When the vehicle is provided with a back light, the light means is visible through the glass which constitutes the brake light itself.

The unit may define a housing for a storage battery or, in a modification, the unit may incorporate leads for connection to suitable connections to the battery of the vehicle through the existing harness.

The housing is adapted to be mounted on the back light of a vehicle and may include at least one upper or lower mounting flange adapted to be secured to the glass by a suitable adhesive means.

Conveniently one of the flanges has an outer edge of chisel outline which can be inserted under the sealing strip for the glass, and the other flange is

then secured to the glass by the adhesive, which may comprise an adhesive packing strip of a thickness chosen to ensure that the unit is mounted at a chosen attitude with respect to the vehicle. The attitude may be chosen by lining up a mark at the end of the housing at a chosen angle with respect to the plane of the glass. The mark may be defined by a slit in the housing which can then be used in a similar manner to that of a gun sight.

The sensor means and the light means are mounted on a circuit board housed in the housing.

In one construction the sensor means comprises a mercury switch, responsive to deceleration and to the attitude of the vehicle. The light means comprises a plurality of horizontally arranged LEDs (light emitting diodes) which are adapted to flash simultaneously. Normally they will flash at a constant frequency. However, in a modification, the frequency may increase with increase in the rate of deceleration of the vehicle. Normally substantially five red LEDs are provided, and a single green LED may also be mounted on the housing to be visible to the driver by reflection through the rear view mirror of the vehicle, as an indication that the unit is operable.

One embodiment of my invention is illustrated in the accompanying drawings, in which:-

Figure 1 is a transverse section through signalling apparatus for a road vehicle;

Figure 2 is a front view of the apparatus;

Figure 3 is a section on the line 3-3 of Figure 1; and

Figure 4 is a circuit diagram.

The apparatus illustrated in the drawings is in the form of a self-contained unit comprising an elongate housing 1 in the form of a one-piece plastics mounting. The housing 1 comprises a contiguous wall 2 defining a relatively short upper wall portion 3 and a substantially longer lower wall portion 4 which are integral with an arcuate rear wall portion 5 and are spaced apart in a parallel relationship. The wall 2 is closed at opposite ends by end walls 6 and 7. The upper and lower wall portion 3 and 4 lead into oppositely directed, outwardly extending, transverse flanges 8 and 9 defining an open mouth and which extend substantially between the end walls 6 and 7 of the housing. The flanges 8 and 9 lie in a common plane inclined with respect to the upper and lower wall portions 3 and 4, and are each provided with a chisel edge 8a and 9a. An elongate circuit board 10 extending substantially between the end walls 6 and 7 of the housing defines a mounting for five red LEDs 11,12,13,14 and 15 which face the mouth, and a mercury switch 16 which is responsive both to deceleration and the attitude of a vehicle. A further LED 17 for example green in colour, projects through the arcuate rear portion 5 of the housing. A battery 18 accessible through a removable access cover 19 in the arcuate rear portion 5 is connected to the LEDs 11-15, and 17, through the mercury switch 16. The mouth may be closed by a transparent or translucent cover 19 through which the red LEDs 11-15 may project.

The unit is adapted to be mounted on the glass defining a back light 20 of a vehicle. The relative lengths of the wall portions 3 and 4 and the angle of the flanges 8 and 9 are chosen so that when the housing is in position with the flanges co-operating with the glass 20 the wall portions 3 and 4 are substantially horizontal. In this attitude the mercury switch 16 is in an "off" position.

The housing may be secured to the glass adjacent to the upper edge of the back light by inserting the upper flange 8 under the sealing strip for the glass with the assistance of the chisel edge 8a. The lower flange 9 is then secured to the glass by a suitable adhesive. An adhesive packing strip 21 may be required to ensure that the unit is mounted at the correct attitude. Should it be desired to install the housing close to the lower range of the back light, then the lower flange 9 can be inserted under the sealing strip with the upper flange 8 secured to the glass. In a modification both flanges 8 and 9 may be secured to the glass by respective adhesive strips 21 and 22.

To facilitate the mounting operation the end walls 7 of the housing may be provided with a longitudinally extending slot 22 which is parallel to the wall portions 3 and 4 and can be used for sighting purposes, in a similar manner to that of a gun sight, to determine the attitude of the housing 1.

When the unit is installed on the back light, excessive deceleration of the vehicle, either upon application of the brakes, or otherwise, for example as a result of an accident, the mercury switch 16 is actuated to energise the LEDs 11-15, and 17.



The red LEDs 11-15 flash simultaneously at a constant frequency to act as a warning to a following vehicle. They are visible for a range of approximately 1,000 metres.

The LED 17 is visible to the driver of the vehicle through the rear view mirror as an indication that the unit is operable.

The rate of deceleration at which the LEDs may become energised is chosen to suit the particular vehicle with which it is to be used.

The unit is provided in a range of housings chosen to suit the inclination of a range of vehicle back lights. In a modification the battery 18 may be omitted with the electrical energy provided by means of connections to the battery of the vehicle.

An electrical circuit is illustrated in Figure 4 of the drawings and from which it will be seen that, in this instance, the mercury switch 16 activates a circuit which flash the LEDs 11-15, and 17. However various other alternatives are available.

As illustrated in Figure 4 IC 1 is a timer chip to determine the frequency of the pulses sent to the LEDs 11-15, and 17. This may comprise a standard CMOS 555 chip.

Resistors  $R_1/R_2$  and capacitors  $C_1/C_2$  control the width of the pulses applied to the LEDs 11-15, and 17, and the interval between the pulses.

$TR_1$  is a transistor used to switch power to the LEDs 11-15, and 17, and resistors  $R_3/R_4$  control the operating current of the LEDs 11-15, and 17.

CLAIMS

1. Signalling apparatus for road vehicles comprising a self-contained unit adapted to be mounted at the rear of a vehicle, the unit including sensor means at least responsive to the deceleration of the vehicle and independent of operation of a brake pedal, and light means independent of the lights of the vehicle and visible to following vehicles, the light means being adapted to be illuminated to emit a warning signal by means of an electric current supplied to the light means under the control of the sensor means.
2. Signalling apparatus as claimed in claim 1, in which the sensor means is adapted to energise the light means to achieve illumination when the rate of deceleration of the vehicle exceeds a predetermined value.
3. Signalling apparatus as claimed in claim 1 or claim 2, in which the sensor means is also be responsive to the attitude of the vehicle.
4. Signalling apparatus as claimed in any preceding claim, in which the unit comprises a housing including a chamber for a storage battery.
5. Signalling apparatus as claimed in claim 4, in which the housing is adapted to be mounted on the back light of a vehicle and includes at least one upper or lower mounting member adapted to be secured to the glass by a suitable adhesive means.
6. Signalling apparatus as claimed in claim 5, in which one of the flanges has an outer edge of chisel

outline which can be inserted under the sealing strip for the glass, and the other flange is then secured to the glass by the adhesive.

7. Signalling apparatus as claimed in any of claims 4-6, in which the attitude of the unit is chosen by lining up a mark at the end of the housing at a chosen angle with respect to the plane of the glass.

8. Signalling apparatus as claimed in claim 7, in which the mark is defined by a slit in the housing which can be used in a similar manner to that of a gun sight.

9. Signalling apparatus as claimed in any of claims 4-8, in which the sensor means and the light means are mounted on a circuit board housed in the housing.

10. Signalling apparatus as claimed in any preceding claim, in which the sensor means comprises a mercury switch responsive to deceleration and to the attitude of the vehicle, and the light means comprises a plurality of horizontally arranged LEDs (light emitting diodes) which are adapted to flash simultaneously.

11. Signalling apparatus as claimed in claim 10, in which the LEDs flash at a constant frequency.

12. Signalling apparatus as claimed in claim 10, in which the LEDs flash at a frequency which increases with increase in the rate of deceleration of the vehicle.

CLAIMS

1. Signalling apparatus for road vehicles comprising a self-contained unit adapted to be mounted at the rear of a vehicle, the unit including sensor means at least responsive to the deceleration of the vehicle and independent of operation of a brake pedal, and light means independent of the lights of the vehicle and visible to following vehicles, the light means being adapted to be illuminated to emit a warning signal by means of an electric current supplied to the light means through an electrical circuit under the control of the sensor means, in which the electrical circuit incorporates means for supplying intermittent pulses to the light means to cause the light means to emit a flashing signal.
2. Signalling apparatus as claimed in claim 1, in which the means for supplying intermittent pulses to the light means supplies the pulses at a constant frequency.
3. Signalling apparatus as claimed in claim 1, in which the means for supplying intermittent pulses to the light means supplies the pulses at a frequency which increases with increase in the rate of deceleration of the vehicle.
4. Signalling apparatus as claimed in any preceding claim, in which the light means comprises a plurality of horizontally arranged LEDs (light emitting diodes).
5. Signalling apparatus as claimed in claim 4, in which the means for supplying intermittent pulses to the light means supplies pulses to the LEDs

simultaneously to cause the LEDs to flash simultaneously.

6. Signalling apparatus as claimed in any preceding claim, in which the sensor means is adapted to energise the light means to achieve illumination when the rate of deceleration of the vehicle exceeds a predetermined value.

7. Signalling apparatus as claimed in any preceding claim, in which the sensor means is also responsive to the attitude of the vehicle.

8. Signalling apparatus as claimed in any preceding claim, in which the means for supplying intermittent pulses to the light means comprises a timer chip.

9. Signalling apparatus as claimed in any preceding claim, in which the sensor means comprises a mercury switch responsive to deceleration and to the attitude of the vehicle.

10. Signalling apparatus as claimed in any preceding claim, in which the unit comprises a housing including a chamber for a storage battery.

11. Signalling apparatus as claimed in claim 10, in which the housing is adapted to be mounted on the back light of a vehicle and includes at least one upper or lower mounting member adapted to be secured to the glass by a suitable adhesive means.

12. Signalling apparatus as claimed in claim 11, in which one of the flanges has an outer edge of chisel outline which can be inserted under the sealing strip

for the glass, and the other flange is then secured to the glass by the adhesive.

13. Signalling apparatus as claimed in any of claims 10-12, in which the attitude of the unit is chosen by lining up a mark at the end of the housing at a chosen angle with respect to the plane of the glass.

14. Signalling apparatus as claimed in claim 13, in which the mark is defined by a slit in the housing which can be used in a similar manner to that of a gun sight.

15. Signalling apparatus as claimed in any of claims 10-14, in which the sensor means and the light means are mounted on a circuit board housed in the housing.

16. Signalling apparatus substantially as described herein with reference to and as illustrated in the accompanying drawings.

**Relevant Technical Fields**

- (i) UK Cl (Ed.M)      G1K
- (ii) Int Cl (Ed.5)      G01P 1/08; B60Q 1/44

Search Examiner  
 T S SUTHERLAND

Date of completion of Search  
 24 FEBRUARY 1994

**Databases (see below)**

- (i) UK Patent Office collections of GB, EP, WO and US patent specifications.
- (ii) ONLINE DATABASES: WPI

Documents considered relevant following a search in respect of Claims :-  
 1-12

**Categories of documents**

- X:** Document indicating lack of novelty or of inventive step.      **P:** Document published on or after the declared priority date but before the filing date of the present application.
- Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.      **E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- A:** Document indicating technological background and/or state of the art.      **&:** Member of the same patent family; corresponding document

Category	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 2239521 A      (MORGAN) Figure 1	5
Y	EP 0299933 A      (BPT) Figures 2, 5, 6	10, 11
Y	US 5148147      (KOBRES) Claim 1	12
X,Y	US 4890091      (GAGE) Column 1 lines 20-46	X: 1-4 Y: 5, 10-12

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).