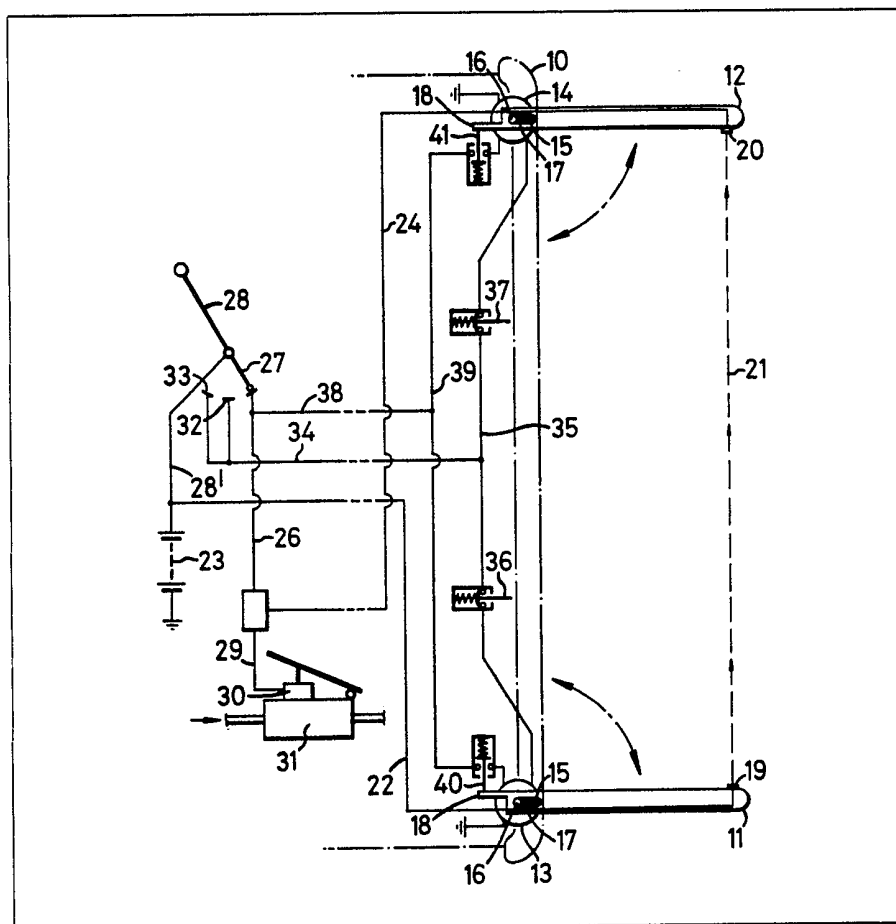


- (21) Application No **8205199**  
(22) Date of filing  
**22 Feb 1982**  
(43) Application published  
**28 Sep 1983**  
(51) **INT CL<sup>3</sup> B60T 7/12**  
(52) Domestic classification  
**G4N 1D 4X 5A 5C1 6V**  
**CA**  
**U1S 1820 2189 G4N**  
(56) Documents cited  
**None**  
(58) Field of search  
**G4N**  
(71) Applicant  
**Ogden Electronics**  
**Limited**  
**(Great Britain)**  
**c/o The Ogden Group of**  
**Companies**  
**Otley**  
**Yorkshire LS21 1HX**  
(72) Inventor  
**James Steel**  
(74) Agent and/or Address for  
Service  
**F J Cleveland and**  
**Company**  
**40-43 Chancery Lane**  
**London WC2A 1JQ**

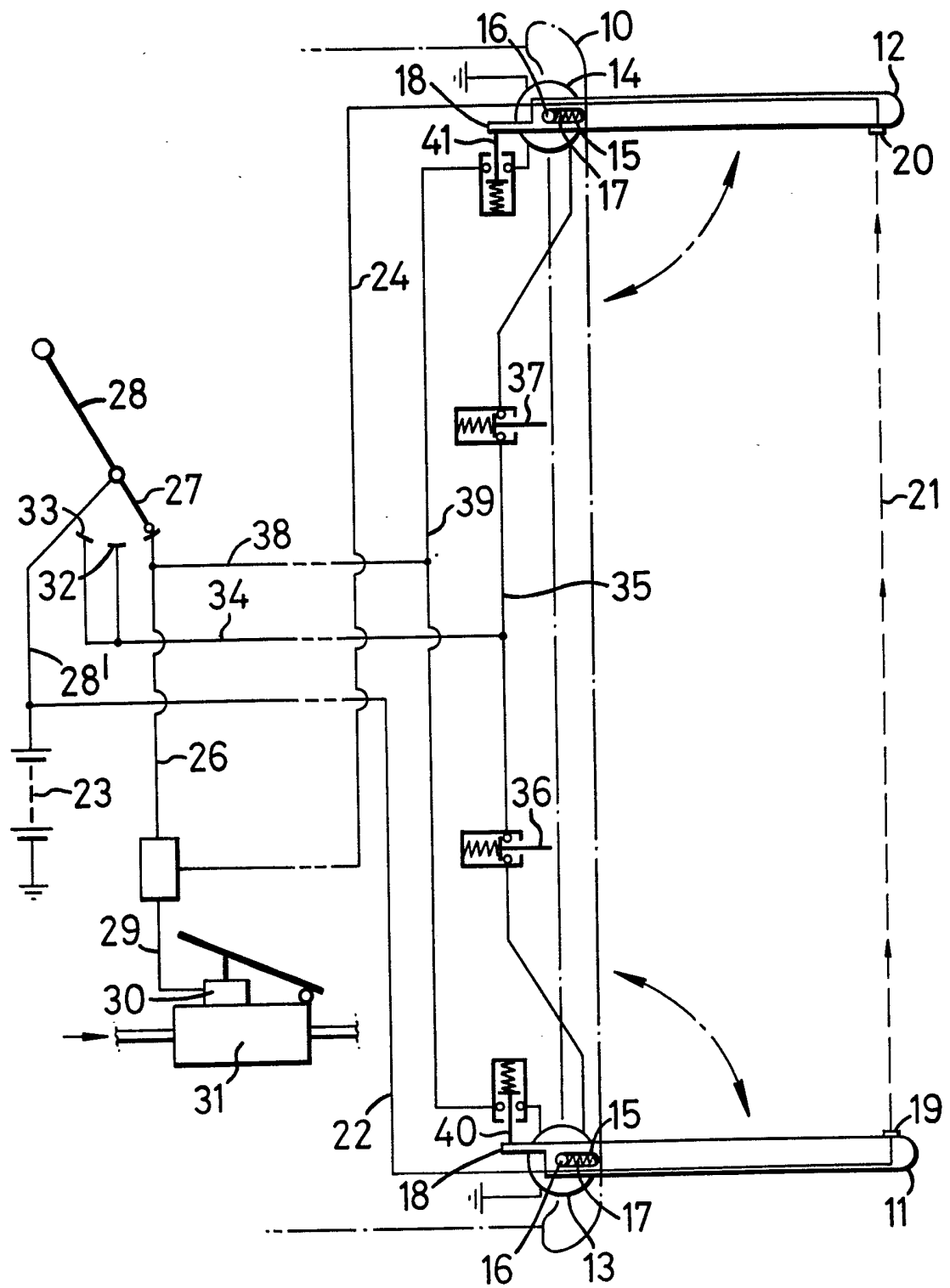
**(54) A safety system for a vehicle**

reversal of the vehicle.

(57) A safety system for a vehicle comprises a pair of arms (11, 12) pivotally mounted at the rear of the vehicle for moving from a first position parallel to a rear surface of the vehicle to a second position at right angles to the rear surface when reverse gear of the vehicle is selected. One of the arms is provided with a light emitting device (19) and the other arm is provided with a photocell (20). If the photocell is blocked from the light emitting device by the presence of a body between the arms (11, 12) or either or both of the arms displaced by engaging a body causing the photocell (20) to fail to receive light from the emitting device (19), a switch (30) is operated effecting actuation of a valve (31) of the braking system of the vehicle thereby arresting



**GB 216765 A**



## SPECIFICATION

### A safety system for a vehicle

- 5 The present invention relates to a safety system for a vehicle.

It is known to provide a safety system for a motor vehicle, such as a dump truck for use in open cast mining, comprising an electrical

- 10 circuit including a switch operable by a gear shift of the vehicle when reverse gear is selected, a radar scanner and means for operating a braking system of the vehicle. The arrangement is such that when reverse gear is selected the braking system of the vehicle is operated automatically if the scanner detects a hazard in the path of the vehicle while reversing.

- 20 While such a safety system may be acceptable for some applications, for other applications it may be regarded as expensive. It is desirable, therefore, to provide a safety system for a vehicle which is less expensive than hitherto without impairing the effectiveness of the system.

- According to the present invention there is provided a safety system for a vehicle comprising a pair of carrier members adapted to extend from a surface of the vehicle in spaced relation one to another and movably mounted relative to the said surface, a pair of electrically responsive transducers each adapted to be carried by a corresponding one of the carrier members, a first of said transducers being adapted to transmit radiation and a second of said transducers being adapted to receive radiation transmitted from said first transducer across a space between the carrier members, electrically operable means for operating a braking system of the vehicle, an electric switch operable by a motion direction selector of the vehicle, and an electric circuit including the switch, each of the transducers and the said means and arranged such that, when the selector is moved to select motion of the vehicle in a direction away from the said surface and substantially orthogonal to the direction of motion of the said radiation, the circuit is completed and an alarm signal is generated in the circuit if there is any change in reception of the said radiation by said second transducer so that when the alarm signal is generated the braking system of the vehicle is rendered operative to arrest continued movement of the vehicle in the said direction.

- The carrier members therefore replace the radar scanner of apparatus known hitherto and the circuit is completed if, after the switch has been operated, the second transducer either fails to continue to receive radiation from the first transducer or receives radiation therefrom when normally no such radiation is received. Such would occur if, during motion of the vehicle in the said direction, either the

transmission of radiation from the first transducer to the second transducer is interrupted by an object or one or other of the carrier members engages an object and the or each carrier member is moved relative to the surface.

- 70 The carrier members may each be mounted for pivotal movement from a position substantially parallel to the said surface to a second position substantially orthogonal to the said surface.

- In this manner, the carrier members do not protrude from the surface when the selector is in a neutral position or has been moved to a position to select motion of the vehicle in an opposite direction to the said direction.

- Each carrier member may be mounted for pivotal movement relative to an axis and for rectilinear movement in a radial direction of the axis.

- If, therefore, one or both of the carrier members engage an object extending parallel to the said surface with a force which is directed at right angles to the said surface, the carrier member is displaced thereby effecting an alarm signal and completion of the circuit.

Resilient biasing means may be provided for restraining said rectilinear movement.

- 95 Delay means may be provided for delaying transmission of drive to the vehicle in the said direction and after the selector has been moved to a position to select drive in the said direction, so that transmission of drive is delayed until the carrier members are at the second position.

- Following is a description, by way of example only and with reference to the accompanying drawing which is a diagrammatic representation, of one method of carrying the invention into effect.

- Referring to the drawing, there is shown a bumper bar (10) of a vehicle having a pair of elongate slots (not shown) each for receiving a corresponding one of a pair of elongate arms (11), (12). An end portion of each arm (11), (12) is located in a slot (not shown) extending radially of a corresponding one of a pair of shafts (13), (14) each rotatably driven on a central longitudinal axis thereof by a corresponding one of a pair of electrically operated motors (not shown). Each said end portion of the arms (11), (12) is provided with an elongate slot (15) in which is located a pin (16) extending axially of the corresponding shaft (13), (14). Each slot (15) is provided with a helical spring (17) which resiliently biases the corresponding arm (11), (12), in a longitudinal direction of the corresponding slot (15) so that the corresponding pin (16) is located at a rear end of the slot (15). Each arm (11), (12) is provided with a rearwardly extending lug (18). The arms (11), (12) are pivotable relative to the central longitudinal axis of the shafts (13), (14) from a first position in which

a central longitudinal axis of each of the arms (13), (14) extends substantially parallel to a central longitudinal axis of the bumper bar (10) to a second position in which the longitudinal axis of the arms (11), (12) extend substantially orthogonal to the central longitudinal axis of the bumper bar (10), as indicated by the arrows in the drawing.

A forward end portion of the arm (11) is provided with a light emitting device (19) and a forward end portion of the arm (12) is provided with a light receiving device (20). The arrangement is such that when the arms (11), (12) are each in the second position as shown in the drawing, the light receiving device (20) receives light emitted from the light emitting device (19) in the form of a beam (21).

The light emitting device (19) is connected in an electrical circuit comprising a line (22) connecting the device (19) to a battery (23) and a line (24) connecting the light receiving device (20) to an input terminal of a control box (25). A second input terminal of the control box (25) is connected by a line (26) to a terminal of a switch (27) operated by a gear lever (28) of a vehicle which terminal is contacted by the switch (27) when the gear lever (28) is in a position for selecting reverse gear of the vehicle. An output terminal of the control box (25) is connected by a line (29) to a switch (30) for operating a valve (31) of a braking system of the vehicle.

The switch (27) comprises two further contacts (32), (33), each of which is closed when the gear lever (28) is moved respectively to a neutral position and to a position for selecting a forward gear, and a line (28') connecting a positive terminal of the switch to the battery (23). The contacts (32), (33), are connected in parallel by a line (34) which is tapped from a line (35) containing two microswitches (36), (37), opposite ends of the line (35) being connected to positive terminals of the motors for turning the shafts (13), (14) respectively. The microswitches (36), (37) are actuated to disconnect supply of current along the line (35) when the arms (11), (12) are pivoted to the first position. The line (26) is tapped by a line (38) which also taps a line (39) connecting negative terminals of the motors for pivoting the arms (11), (12), the line (39) containing microswitches (40), (41) which are actuated by the lugs (18) of the arms (11), (12) so as to cut off supply of current through line (39) when the arms (11), (12) are pivoted to the second position.

The control box (25) also is provided with a second output (not shown) for controlling an electrically operable gear selection mechanism and is arranged such that electrical power is supplied to the selection mechanism only when current is supplied simultaneously to the control box (25) along the lines (24) and (26).

During normal operation of the vehicle, the

arms (11), (12) would be located in the first position thereof. However, when reverse gear of the vehicle is selected, the gear lever (28) is moved to the position shown in the drawing with a result that current is supplied from the battery (23) through the switch (27) and the line (26) to the control box (25) and through the lines (38) and (39) and the contacts of the microswitches (40), (41) to the motors for driving the shafts (13), (14). In consequence, although the gear lever (28) has been moved to select reverse gear, the gear has not yet been selected because no current has yet been supplied along the line (24). However, current has been supplied to the motors for driving the shafts (13), (14) and in consequence, the arms pivot from the first position to the second position. When in the second position the microswitches (40), (41) are actuated by the lugs (18) of the arms with result that the contacts of the microswitches (40), (41) disengage their respective terminals and power to the motors is cut off. The light emitting device (19) and the light receiving device (20) register one with another and a light beam (21) is established between the devices (19), (20) and a circuit is completed through the line (24) to the control box (25). The gear selector mechanism thus is actuated and reverse gear is selected.

If one or other or both of the arms (11), (12) are disturbed during reversal of the vehicle by, for example, engaging an object or if the arms (11), (12) pass on either side of an object, the light emitting device (19) and the light receiving device (20) move out of alignment one with another or radiation from the device (19) is blocked from the device (20) with the result that actuation of the light receiving device (20) by the light emitting device (19) is discontinued and supply of current to the control box (25) through the line (24) is discontinued. As a result, signals are transmitted from the control box (25) to the switch (30) through the line (29) and the valve (31) is actuated causing the braking system of the vehicle to be operated.

When neutral or a forward gear is selected by moving the gear lever (28) from the position shown in the drawing to one or other of the other contacts of the switch (27), current is supplied to the motors for operating the arms (11), (12) through the line (35), with a result that the motors are operated in a reverse direction and the arms (11), (12) pivot from the second position to the first position. As the arms approach the first position, the microswitches (36), (37) are operated upon engagement by the arms (11), (12) with a result that supply of current to the motors is discontinued.

It will be appreciated that the system in accordance with the present invention may be provided with an override mechanism whereby supply of current through the line

(29) to the switch (30) is discontinued only when neutral or a forward gear is selected by moving the gear lever (28) while, at the same time, providing a delay in supplying current to the lines (34), (35) to effect movement of the arms (11), (12) from the second position to the first position.

- 10 It will also be appreciated that the arms (11), (12) may be arranged to pivot about axes extending parallel to the axes of rotation of ground engaging wheels of the vehicle instead of extending orthogonal thereto as shown in the accompanying drawing.

## 15 CLAIMS

1. A safety system for a vehicle comprising:—

- 20 a pair of carrier members adapted to extend from a surface of the vehicle in spaced relation one to another and movably mounted relative to said surface,  
 a pair of electrically responsive transducers each adapted to be carried by a corresponding one of the carrier members, a first of said  
 25 transducers being adapted to transmit radiation and a second of said transducers being adapted to receive radiation transmitted from said first transducer across a space between the carrier members,  
 30 electrically operable means for operating a braking system of the vehicle,  
 an electric switch operable by a motion direction selector of the vehicle and,  
 an electric circuit including the switch, each  
 35 of the transducers and the said means and arranged such that, when the selector is moved to select motion of the vehicle in a direction away from the said surface and substantially orthogonal to the direction of  
 40 transmission of the said radiation, the circuit is completed and an alarm signal is generated in the circuit if there is any change in reception of the said radiation by said second transducer so that when the alarm signal is  
 45 generated the braking system of the vehicle is rendered operative to arrest continued movement of the vehicle in the said direction.

2. A safety system as claimed in Claim 1 wherein the carrier members are each  
 50 mounted for pivotal movement from a first position substantially parallel to the said surface to a second position substantially orthogonal to the said surface.

3. A safety system as claimed in Claim 2 wherein each carrier member is mounted for pivotal movement relative to an axis and for rectilinear movement in a radial direction of the axis

4. A safety system as claimed in Claim 3 wherein resilient biasing means is provided for restraining said rectilinear movement

5. A safety system as claimed in any one of claims 2 to 4 wherein delay means is provided for delaying transmission of drive to  
 65 the vehicle in the said direction and after the

selector has been moved to a position to select drive in the said direction, so that transmission of drive is delayed until the carrier members are at the second position.

- 70 6. A safety system for a vehicle substantially as hereinbefore described and as illustrated in the accompanying drawing.

---

Printed for Her Majesty's Stationery Office  
 by Burgess & Son (Abingdon) Ltd.—1983.  
 Published at The Patent Office, 25 Southampton Buildings,  
 London, WC2A 1AY, from which copies may be obtained.