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TRAILER LAMP FUNCTION TEST DEVICE
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- (56) Prior Art Documents
US 5192912
US 5086277
US 4866390
- (57) Claim


1. A tractor trailer lamp function test device for a trailer having signal lamps in respective trailer circuits which can be releasably coupled to corresponding tractor vehicle circuits with a conventional plug and socket connection,

comprising an electric energiser, a test lamp, and a switch in test circuits operable to close a test circuit through at least one trailer signal lamp, said electric energiser energising said test lamp if said trailer signal lamp and its said trailer circuit are both in serviceable condition,

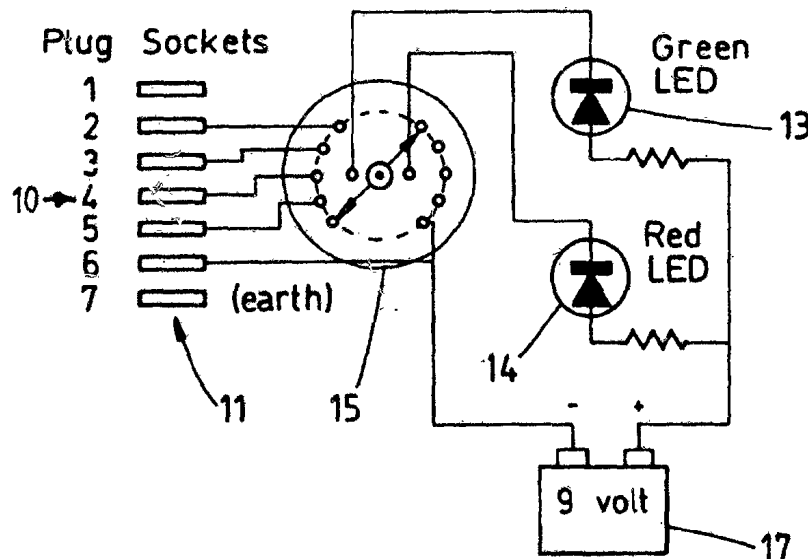
said test circuit further comprising a diode separating it electrically from each other said test circuit.



IP

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<p>(21) International Application Number: PCT/AU94/00190 (22) International Filing Date: 15 April 1994 (15.04.94) (30) Priority Data: PL 8318 15 April 1993 (15.04.93) AU (72) Applicants and Inventors: WALKINGTON, Clifford [AU/AU]; 39 Selth Street, Albert Park, S.A. 5014 (AU). GRIST, Lindsay, Raymond [AU/AU]; 5 Kanangra Road, Seaview Downs, S.A. 5049 (AU). (74) Agent: MADDERN, Ken; 5th floor, 150 Grenfell Street, Adelaide, S.A. 5000 (AU). (i) Agure Blue International Pty Ltd c/- Nelson Wheeler, Chartered Accountants 203 East Terrace, Adelaide, S.A.</p>		<p>(81) Designated States: AU, CA, DE, GB, US. Published With international search report. <div style="font-size: 2em; text-align: center; margin: 20px 0;">683054</div> <div style="text-align: center;">  </div> </p>

(54) Title: TRAILER LAMP FUNCTION TEST DEVICE



(57) Abstract

A trailer lamp function test device comprises a socket (10, 11) adapted to receive the pins of a plug of a trailer vehicle. The test device further comprises an electric energiser (17) and a rotary selector switch (15) which can be positioned selectively to test all trailer circuits of the trailer vehicle and their respective signal lamps by energising of respective test lamps (13, 14; 20, 21, 23, 24, 25) for circuit continuity. At the same time, the part of the plug-and-socket connection on a tractor vehicle may be tested to ensure that energy is transmitted when the respective switches are closed by a driver.

TRAILER LAMP FUNCTION TEST DEVICE

This invention relates to a device which will simplify the testing of trailer lamp functions.

BACKGROUND OF THE INVENTION

At the present time, it is usually required to have two people to test the functions of a trailer light configuration, one being required to stand behind the trailer and the other being required to operate the controls within the cabin of a vehicle (for example a truck), including the turning lamps, the tail light and the brake light. Particularly with the brake light, it is not reasonably feasible for a single operator to ascertain whether or not his brake lights are functioning.

However, there is frequently a requirement to test lamps of a number of trailer vehicles which may be in a yard, and otherwise ready to depart. In such cases, the time delays associated with such testing are unacceptable. The alternative used has been for a large battery to be wheeled from trailer to trailer, and the function of each trailer lamp circuit to be separately tested. This alternative is still unacceptably slow, and often very inconvenient.

In most countries however it is a legal requirement that all trailer lights should function, and therefore it is necessary for tests to be undertaken, usually before each time a trailer is used.

Problems with circuits of various types have been recognised, and reference may be made to Australian Patent 488353 (Lansing Bagnall) dealing with monitoring current leakage in electric trucks, Australian application 20575/76 (Deere & Company), dealing with determination of continuity in an electric circuit, and Australian Patent 495113 (General Signal Corporation) dealing with ground fault detection. Other less relevant prior art includes Australian Patents 545161 (Lockheed), 501552 (Westinghouse), 497189 (Secheron), Application 87806/91 (British Aerospace) and 585846 (Glover).

None of these however employs the combination of separate testing of the

circuits of a trailer by energising those circuits through a lamp or lamps, ^{in addition to} nor testing a tractor plug to ensure existence of available energy for the circuits.

BRIEF SUMMARY OF THE INVENTION

In this invention, a simple device can be plugged into a socket, or receive the plug of a plug and socket tractor/trailer connection, and test all the trailer circuits and their respective signal lamps by energising a test lamp from an energiser carried by the device through the trailer circuits to ground, by rotation of a rotary switch, or alternatively energise a number of test lamps simultaneously or sequentially by a push button operation, a separate test lamp for each trailer circuit. At the same time, the part of the plug-and-socket connection on a tractor vehicle may be tested to ensure that energy is transmitted when the respective switches are closed by a driver.

BRIEF SUMMARY OF THE DRAWINGS

Two embodiments of the invention are described hereunder in some detail with reference to and are illustrated in the accompanying drawings wherein:

Fig 1 is a fragmentary drawing showing the use of the test device when inserted between a tractor and trailer vehicle;

Fig 2a top view of a seven pin trailer socket assembly;

Fig 2b is an end view;

Fig 2c is a side view;

Fig 3 is a circuit diagram of a first embodiment utilising a rotary switch;

Fig 4a is a top view of a device according to a second and preferred embodiment;

Fig 4b is an end view of the male portion of Fig 4a;

Fig 4c is an end view of the female portion of Fig 4a;

Fig 5 is a circuit diagram which illustrates the circuit of the preferred second embodiment;

Fig 6 illustrates a further embodiment utilising a sequencer to control energising the various circuits of a trailer in sequence; and



Fig 7 illustrates the embodiment of Fig 6 with the additional feature of an inverter to provide a 12 volt/24 volt option.

Referring to the first embodiment of Figs 2a, 2b, 2c and 3, a seven pin trailer socket assembly 10 comprises a plurality of plug pin sockets 11 (within a dome shaped removable cover) adapted to receive the pins of a plug of a trailer vehicle (not shown), the sockets 11 being arranged in a conventional seven pin configuration. A seven pin configuration socket is standard, since it will receive either a five pin plug or a seven pin plug both of which are also standard and conventional. Other configurations can be readily adapted by changing socket arrangements.

The socket assembly 10 comprises a green light emitting diode 13, a red light emitting diode 14, and a rotary selector switch 15.

Fig 3 illustrates the very simple circuit diagram wherein a 9 volt energiser 17 has its negative lead going directly to pin 6 (the ground or earth pin of the plug 11, constituting a common conductor), and the wiper of the rotary selector switch 15 selectively contacts sockets 2, 3, 4 and 5 of the rotary switch 15 (for a five pin mode trailer) or 1 through to 6 (for a seven pin mode). The red LED 14 indicates the existence of sufficient EMF of energiser 17, and the green LED indicates continuity of circuit from the plug through the lamps and back to the plug. It may be noted that the rotary selector switch 15 provides an automatic separation of the tested circuits, which is otherwise required to be separated by gating diodes as described hereunder.

The second embodiment which is illustrated in Figs 1, 4a, 4b, 4c and 5 illuminates the light emitting diodes L1 through to L6 (identified by numerals 20 to 25) simultaneously when they are being checked. In order to do this, there is provided an auxiliary plug and socket assembly 28 which has a plurality of pins 29 (Fig 4b) at its left hand end which plug into a socket 30 at the rear end of a tractor vehicle 31 and sockets 32 at its right hand end (Fig 4c) which receive a plug 33 from a trailer vehicle. The sockets 32 are identical to the original equipment 30 so that the

auxiliary assembly 28 can be removed and the plug 33 repositioned in the socket 30 after a test has been conducted. This embodiment provides a facility whereby separate testing of tractor and trailer individually can take place, as well as when they are coupled together.

Fig 5 illustrates the electrical circuit for the second and preferred embodiment, wherein a 9 volt energiser 17 energises the respective trailer ~~circuit~~^{circuits} through the LEDs 21 to 25 simultaneously upon closure of the push button switch 34, each through a respective resistor 35 and gating diode 36. Because ground (earth) is common to all circuits, it is necessary for the polarity of energiser 17 to be reversed with respect to the main power supply from the vehicle. The diode 37 provides a by-pass gate for the energiser 17.

The second embodiment is preferred to the first, mainly because it provides a function for checking the wiring from the tractor vehicle battery to the socket 30. Whether or not the plug 33 is removed, and the tractor tail light switch turned ON, the tractor tail light socket of plug 30 will be illuminated via diode 36, resistor 35, diode 20 (the first light emitting diode) and gating diode 37 to ground, and this is repeated for all the other light emitting diodes 21 through to 25 for the respective trailer coupled circuits. The auxiliary plug and socket assembly is provided with conductors 38 which extend between corresponding pins 29 and sockets 32, so that in use the trailer circuits and tractor circuits are placed in parallel. If however, the auxiliary assembly 28 is removed from socket 30, push button 34 will cause simultaneous illumination of respective light emitting diodes 20 through to 25 if all the trailer circuits are sound. Thus circuit continuity is readily checked for both tractor and trailer vehicles. Absence of illumination on a corresponding LED indicates a circuit fault.

Even if all the tractor vehicle circuits are energised simultaneously and the switch 34 is closed, the additional current is not sufficient to damage the light emitting diodes.

Diode 37 protects the battery from being reverse charged if flat.



With the arrangement shown, LED's 20, 21, 22 and 23 will be illuminated, for example upon closure of switch 34 for a seven pin configuration, and LED's 22, 23, 24 and 25 for a five pin configuration. This provides a convenient check of the trailer and tractor wiring mode.

Figs 6 and 7 illustrate two alternative circuits which are basically very similar. Fig 7, however, includes an inverter circuit which will ensure full voltage is always available for both a 24 and 12 volt system, Fig 7 being preferred because many prime movers requiring use of the testing facilities of this invention are wired for 24 volts.

Referring first to Fig 6, a switch mode power supply 41 of known type provides a charger for charging a 12 volt energiser 42 through a diode 43, and a second gating diode 44 feeds the switches 45 through to 49 associated with a tractor light ^{circuits} ~~circuit~~, and switches switching through the Schotky diodes 51 and the respective light emitting diode 52 and their respective resistors 53 to the trailer lights 45b through to 49b.

A ^{sequencer} ~~sequence~~ of 56 is initiated by a switch button 57 and sequentially closes the switches 45 through to 49 and repeats for a time which is controlled by a time-out timer clock 58, the sequencer and timer being conventional and in accordance with prior art. The time-out timer, for example, can limit the time of operation of a sequencer 56 to say 25 seconds which would normally give an operator time to ensure that all lights were operative, the lights coming on in turn as the various switches close.

The alternative to the Fig 6 configuration is shown in Fig 7 which enables a single tester to be used for both 12 and 24 volts, there being provided a change over switch 60 for that purpose. Since most of the elements are similar in Figs 6 and 7, similar elements bear similar designation numerals. However, the changeover switch 60 introduces the elements of inverter 61 of known type which performs the function of providing alternatively the 12 volt or 24 volt supply for testing the lights ^{45b-49b} ~~40b~~.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A tractor trailer lamp function test device for a trailer having signal lamps in respective trailer circuits which can be releasably coupled to corresponding tractor vehicle circuits with a conventional plug and socket connection,

comprising an electric energiser, a test lamp, and a switch in test circuits operable to close a test circuit through at least one trailer signal lamp, said electric energiser energising said test lamp if said trailer signal lamp and its said trailer circuit are both in serviceable condition,

said test circuit further comprising a diode separating it electrically from each other said test circuit.

2. A tractor trailer lamp function test device according to claim 1 wherein said switch is a rotary switch which selectively couples said test lamp to respective said test circuits and thereby separately tests said trailer signal lamps and their said trailer circuits.

3. A tractor trailer lamp function test device according to claim 1 wherein there is a separate said test circuit for each said trailer circuit, and a separate said signal lamp in each said test circuit.

4. A tractor trailer lamp function test device according to claim 3 ~~claim 4~~ wherein said switch is in circuit with said energiser and, upon closure, energises all said test lamps simultaneously if all said trailer signal lamps and their said trailer circuits are in serviceable condition.

5. A tractor trailer lamp function test device according to any one of claims 3 or ⁴/~~5~~ wherein said energiser has a terminal coupled to a conductor common to all said trailer lamps, of opposite polarity to that polarity of said tractor vehicle circuits which is coupled to said common conductor through said trailer circuits.

6. A tractor trailer lamp function test device according to claim 1 further comprising an auxiliary electrical plug-and-socket assembly having conductive sockets at one end, conductive pins at the other end, and conductors



between respective said pins and sockets, said pins and sockets being co-operable with a plug and socket of a conventional said trailer and tractor circuit plug and socket connection, said auxiliary electrical plug-and-socket assembly housing said energiser, test lamp and switch.

5 7. A tractor trailer lamp function test device according to claim 6 further comprising electrical couplings between said conductors between said pins and sockets, and said test circuit, in a configuration wherein said test lamp becomes energised upon energising of a said tractor vehicle circuit when said auxiliary electrical plug-and-socket assembly is coupled to said tractor vehicle, thereby also providing a test function of said tractor vehicle circuit.

10 8. A tractor trailer lamp function test device for a trailer having signal lamps in respective trailer circuits coupled to corresponding tractor vehicle circuits, comprising

15 an electrical energiser, a common conductor and respective signal conductors connecting said trailer and tractor circuits, ~~gating~~ diodes in respective said signal conductors, respective switches and light emitting diodes in test circuits between said ~~gating~~ diodes and common conductor, and

20 a sequencer coupled to said switches to close said switches in sequence in a trailer light test mode.

25 9. A tractor trailer lamp function test device according to claim 8 wherein said sequencer comprises an electric mono-stable circuit and an electric clock circuit coupled to a Johnson counter, said clock circuit being so coupled as to limit time of operation of the sequencer.

30 10. A tractor trailer lamp function test device according to claim 8 or claim 9 further comprising an inverter between the energiser and the switches.

DATED this 5th day of May, 1997

AZURE BLUE INTERNATIONAL PTY LTD

By its Patent Attorney

KEN MADDERN



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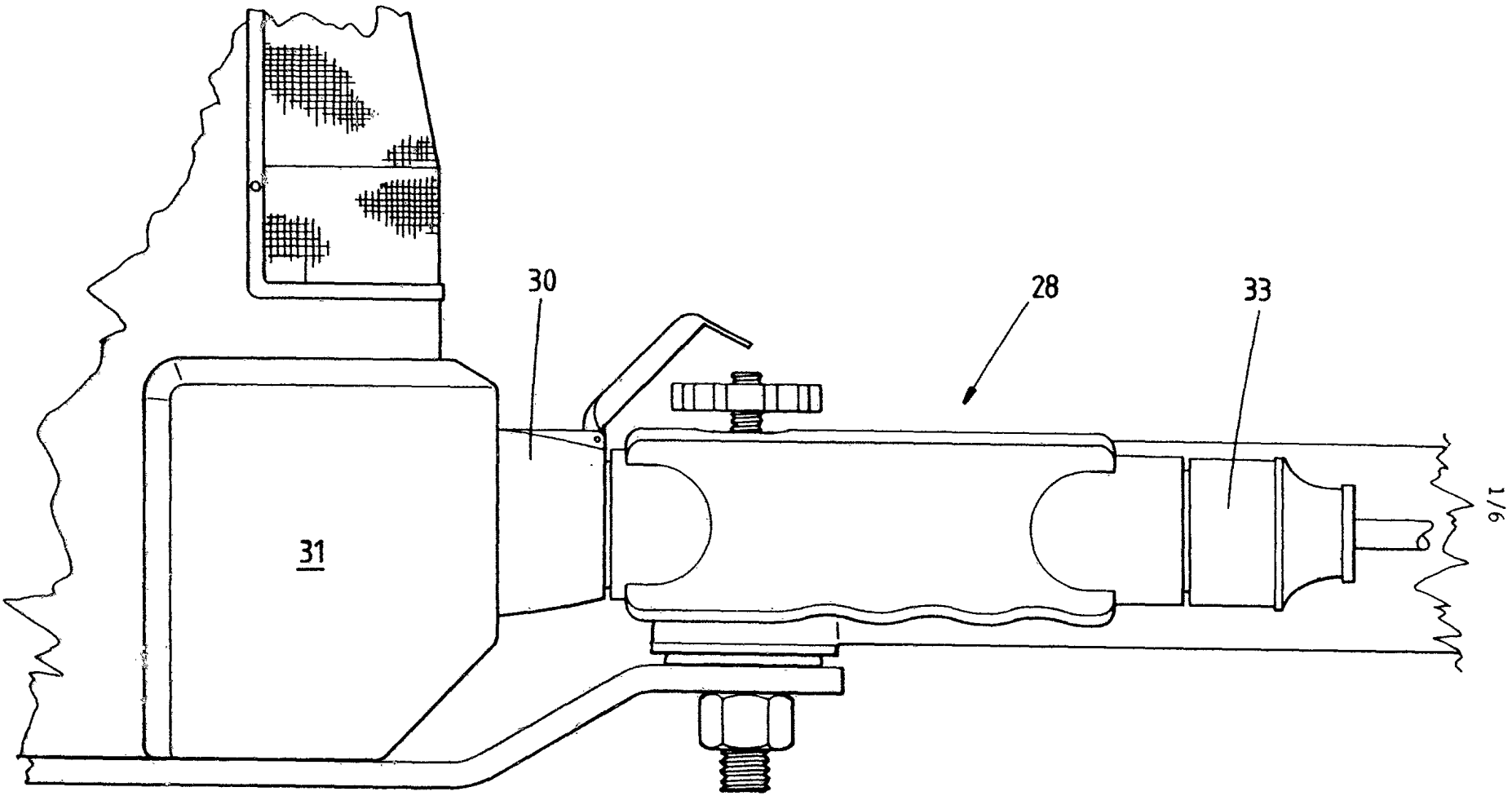


FIG 1

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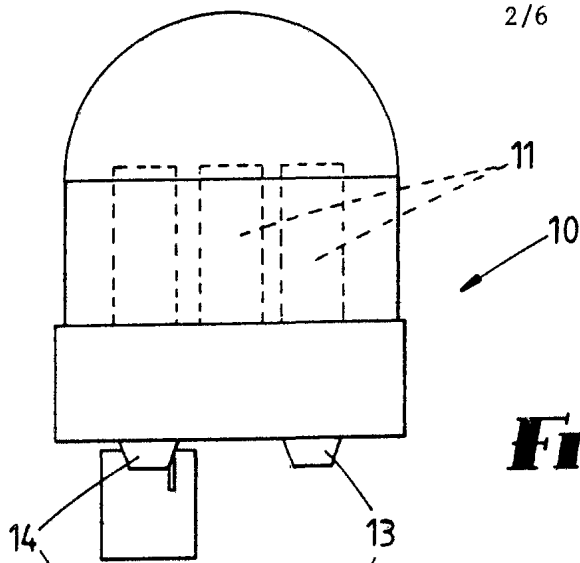


FIG 2a

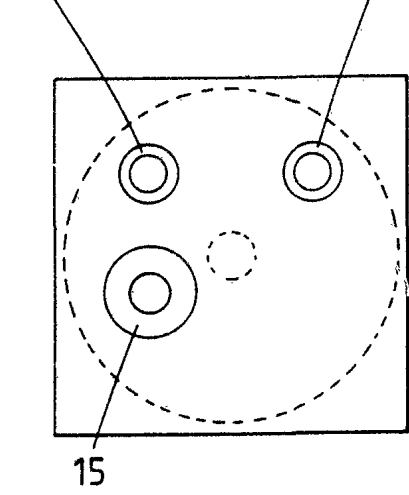


FIG 2b

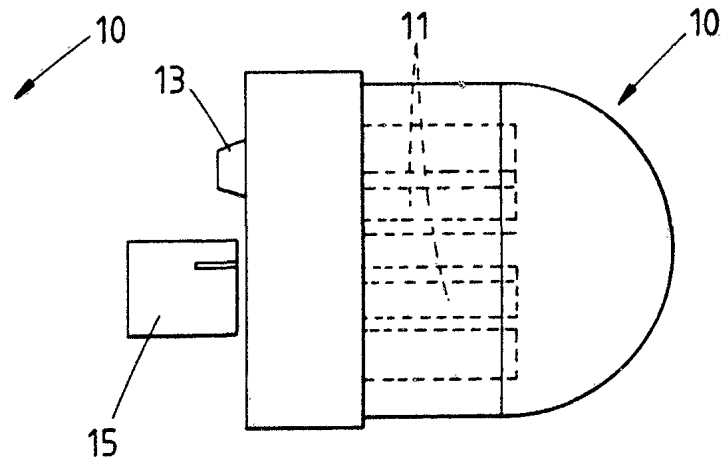


FIG 2c

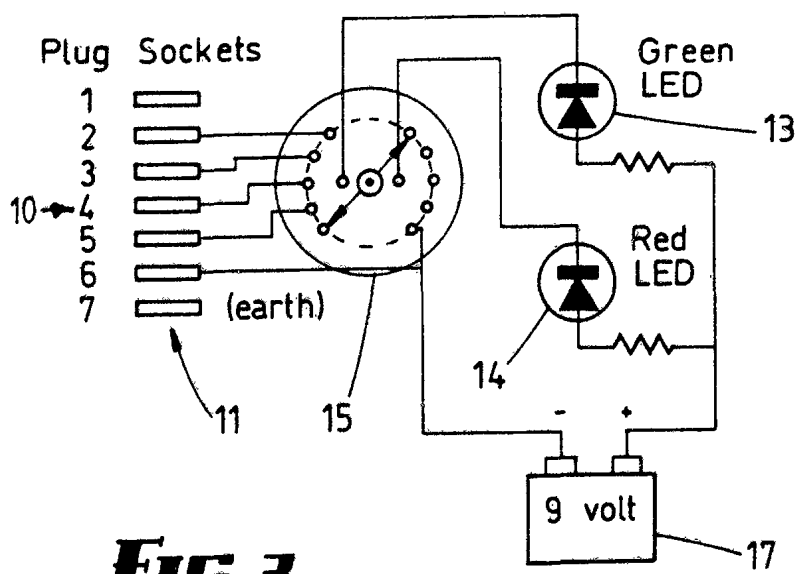


FIG 3

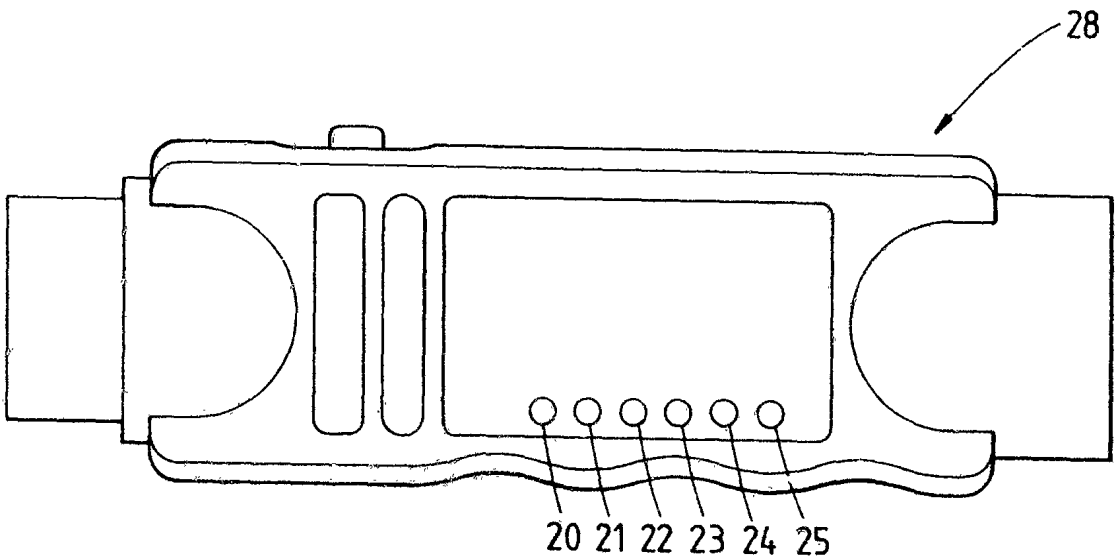


FIG 4a

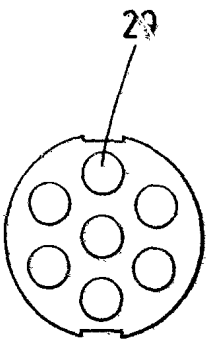
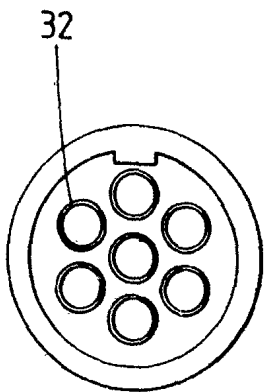


FIG 4b



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FIG 4c

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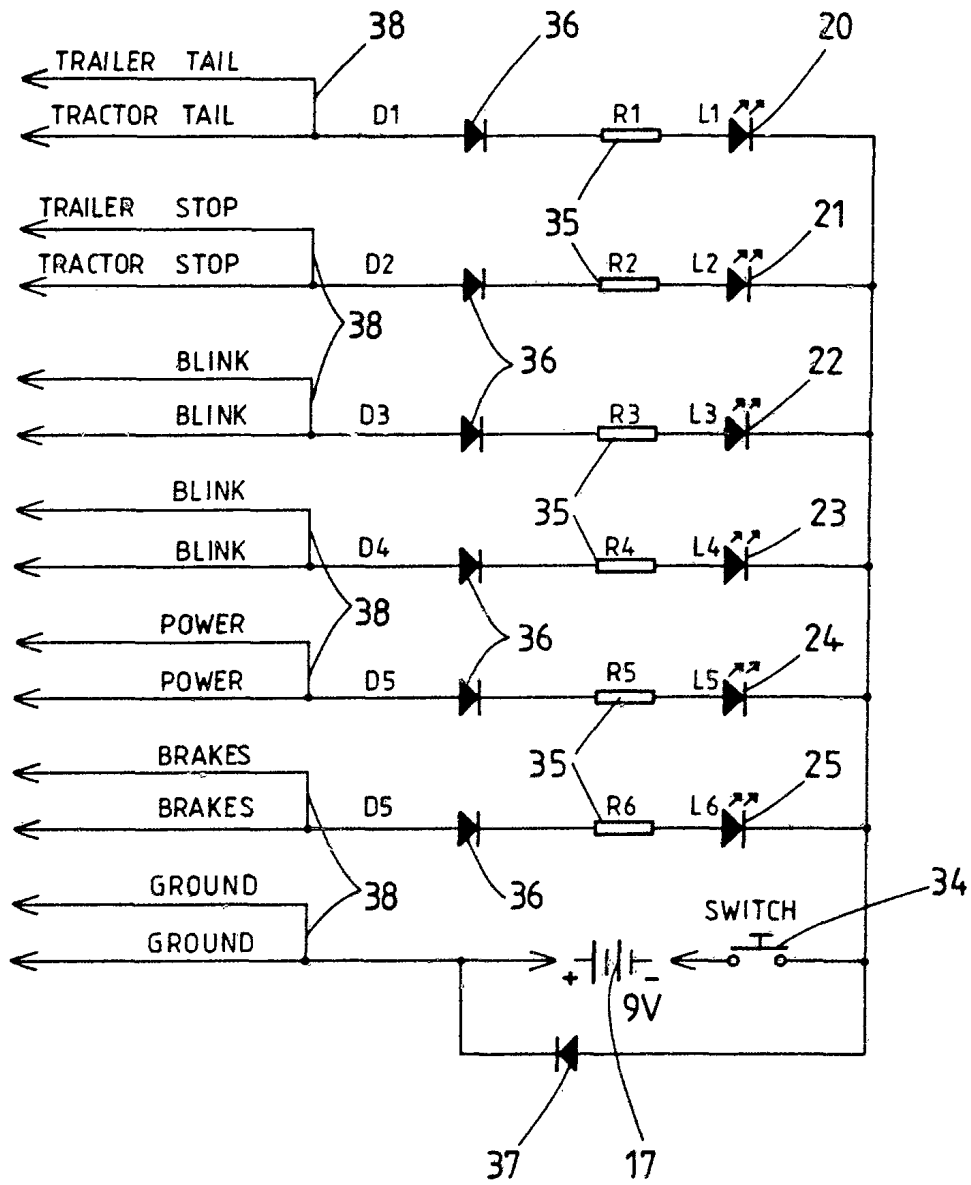


FIG 5

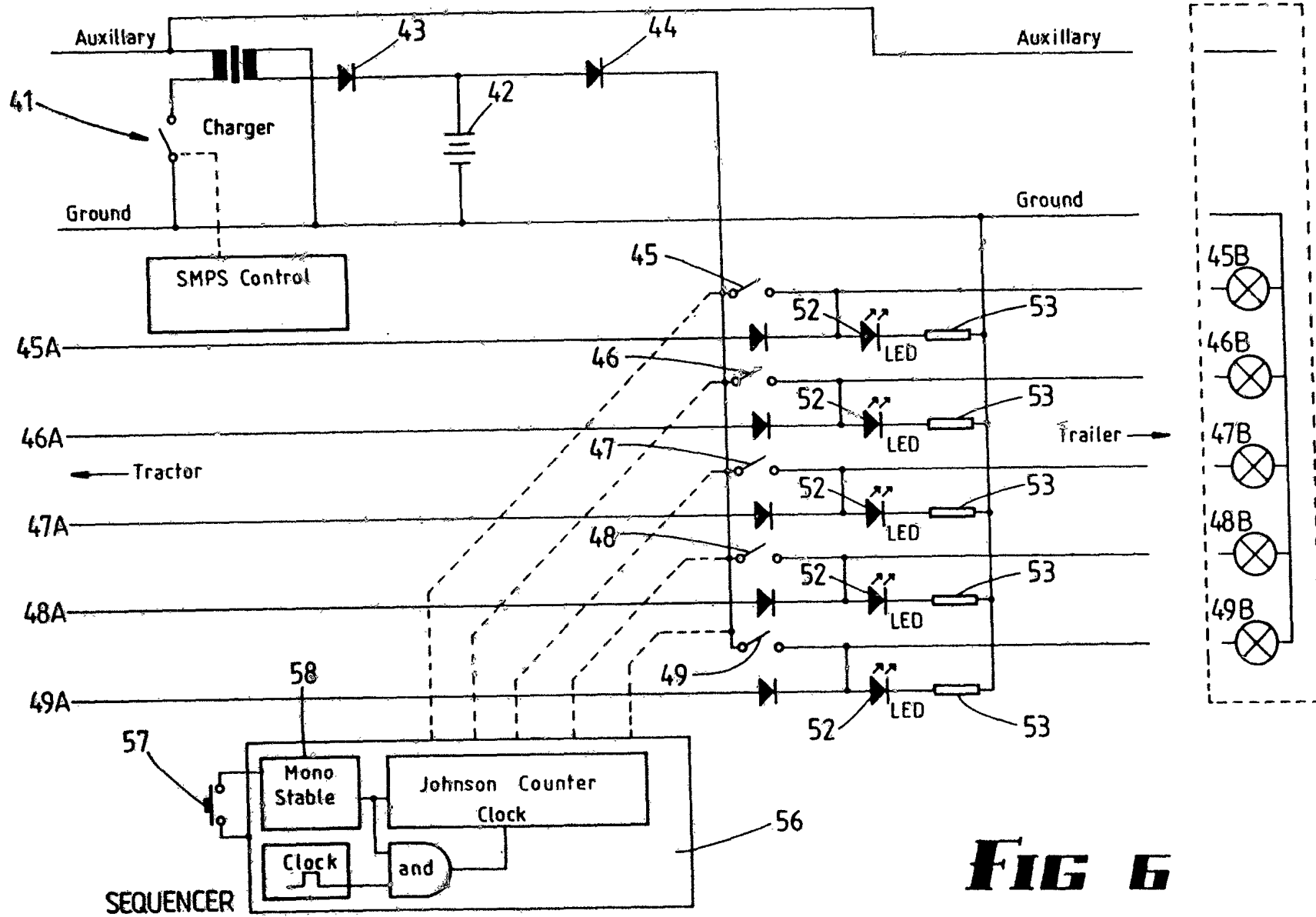


FIG 6

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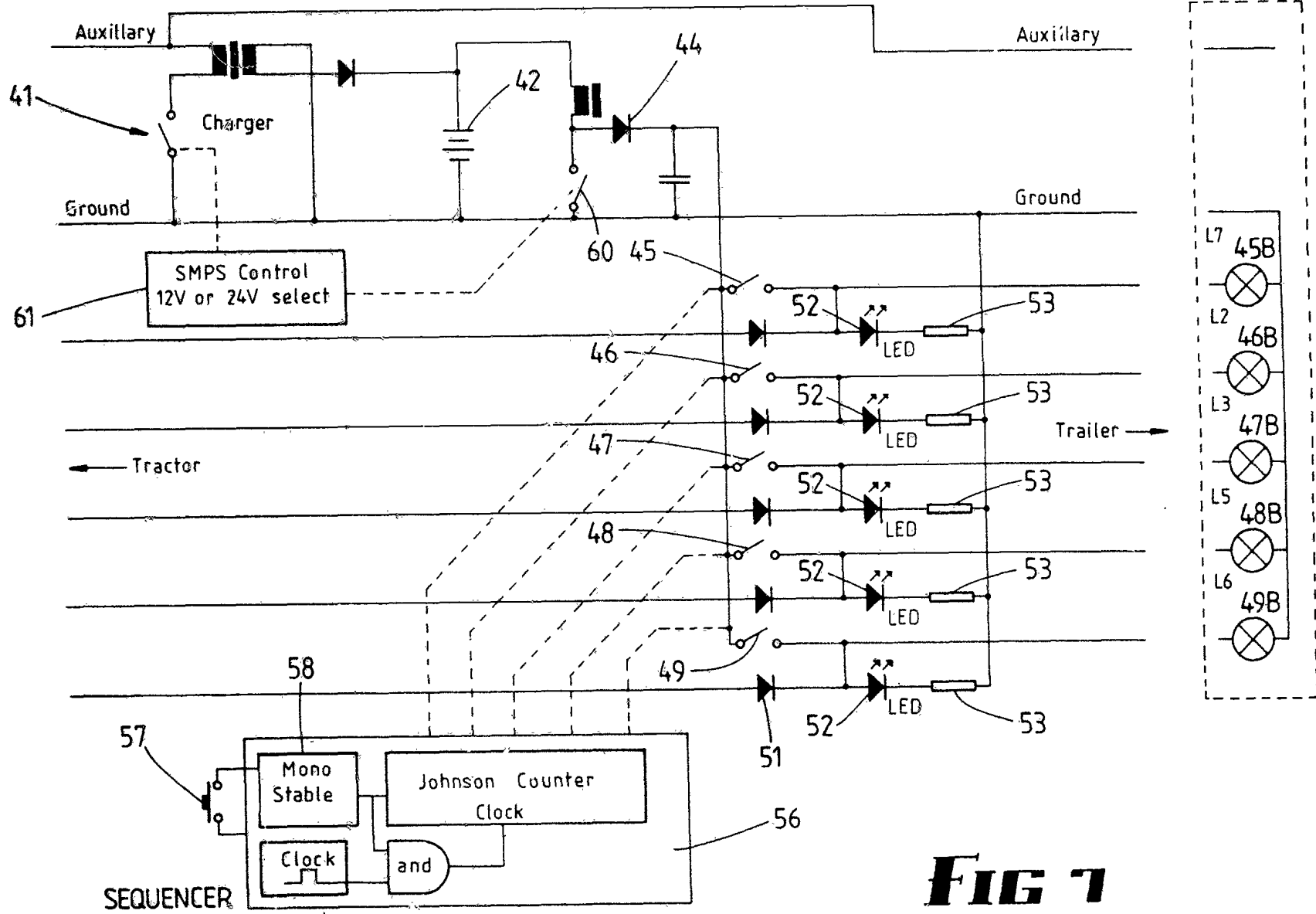


FIG 7

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A. CLASSIFICATION OF SUBJECT MATTER Int. Cl. ⁵ G01R 31/02		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC G01R 31/02		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU : IPC as above		
Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X Y	US,A, 4547722 (SARLO) 15 October 1985 (15.10.85) column 1 line 53 - column 2 line 16 Fig. 5	1,3,5-7 2,4
X Y	US,A, 4884032 (La PENSEE) 28 November 1989 (28.11.89) column 1 line 66 - column 2 line 55 Fig. 1	1,3,5-7 2,4
X	US,A, 4866390 (BUTCHKO) 12 September 1989 (12.09.89) column 3 line 40 - column 4 line 68	1,3,5-7
<input checked="" type="checkbox"/>	Further documents are listed in the continuation of Box C.	<input checked="" type="checkbox"/> See patent family annex.
* Special categories of cited documents :		
"A"	document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"O"	document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search 24 June 1994 (24.06.94)	Date of mailing of the international search report 15 July 1994 (15.07.94)	
Name and mailing address of the ISA/AU AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No. 06 2853929	Authorized officer <i>P.P. Gerondal</i> P.P. GERONDAL Telephone No. (06) 2832174	

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
Y	US,A, 4002972 (KONRAD et al) 11 January 1977 (11.01.77) column 1 lines 61-68, Fig. 2	2,4
A	EP,A, 39122 (THOMAS ELECTRONICS LIMITED et al) 4 November 1981 (04.11.81) pages 2-5	1,11
A	US,A, 3836843 (YONCE) 17 September 1974 (17.09.74) whole document	1,11

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Member
US 4547722	
US 4884032	
US 4866390	
US 4002972	
EP 39122	
US 3836843	3944915
END OF ANNEX	