Sept. 19, 1944. R. B. KENNETT 2,358,332

SIGNAL SYSTEM

Filed April 17, 1941

Fig. 1.

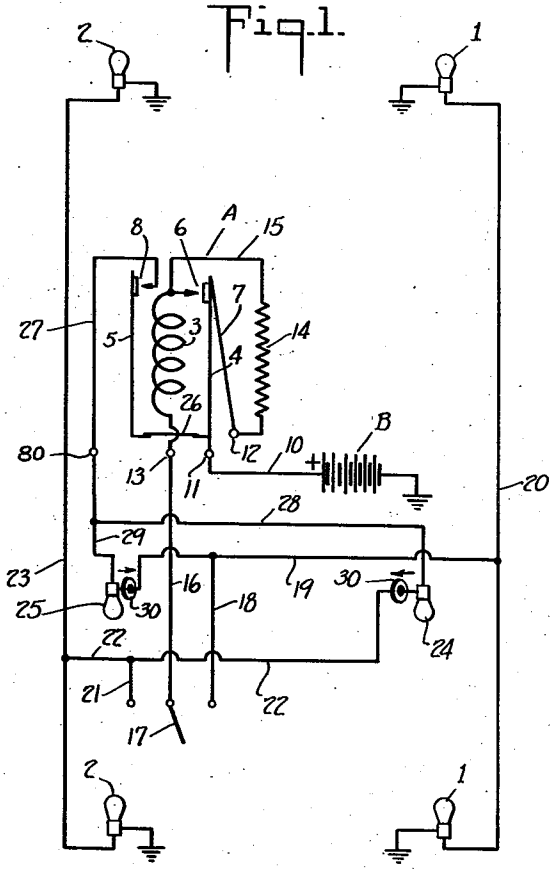


Fig. 2.

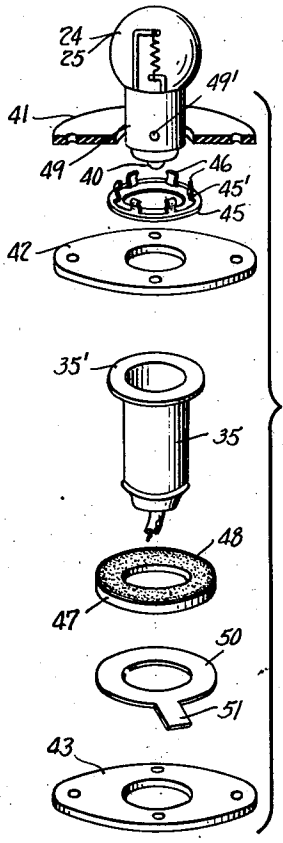
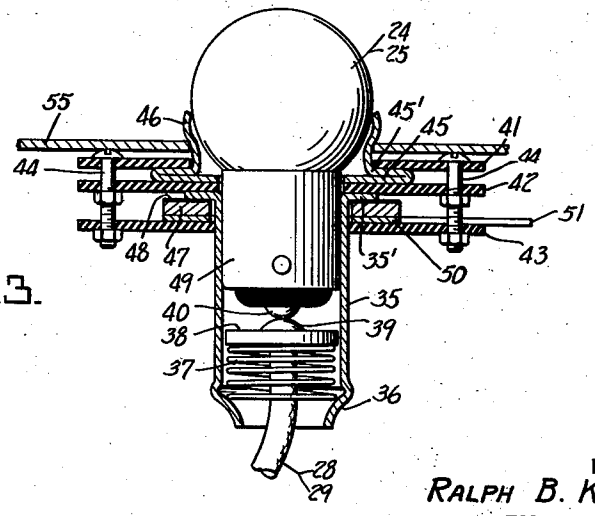


Fig. 3.



INVENTOR
RALPH B. KENNETT
BY
Bartlett, Eyre, Keel & Weymouth
ATTORNEYS

Patented Sept. 19, 1944 2,358,332

UNITED STATES PATENT OFFICE

2,358,332

SIGNAL SYSTEM

Ralph B. Kennett, Elizabeth, N. J., assignor to Tung-Sol Lamp Works, Inc., Newark, N. J., a corporation of Delaware

Application April 17, 1941, Serial No. 388,967

10 Claims. (Cl. 177—311)

This invention relates to signal systems, and particularly to a directional signal system for motor vehicles.

More particularly, the invention relates to a directional signal system employing a double pilot light indication wherein a single pole double throw switch and a single flasher are employed to operate both sides of the system.

In directional signal systems for motor vehicles it is required or is desirable that the system incorporate a pilot lamp that will indicate signal lamp failure in an unmistakable manner, and it is also desirable that two pilot lamps be employed in order that the direction of the turn being signaled shall be evident to the operator of the vehicle. One object of the invention is a novel and improved system embodying these features.

Another object of the invention is a novel and improved directional signal system of the general type above referred to employing a single pole double throw switch for controlling both the front and rear signal lamps and a single double circuit magnetic flasher relay for all signal lamps.

A further object of the invention is a system of this character wherein unmistakable pilot lamp indication is given at all times, the pilot lamps are burned at full illumination, and a minimum number of parts and wires are required, resulting in a system which lends itself to easy and permanently satisfactory installation in ordinary automotive production line assembly.

A further object is to provide a directional signal circuit incorporating a single pole, double throw switch to obtain pilot lamp indication both of signal lamp operation and of signal lamp failure; a feature not previously obtained in directional signal circuits incorporating single pole, double throw switches.

A further object is a novel lamp socket and rectifier unit.

A further object is to provide a convenient means for installing in any lighting circuit an element (a "couple") capable of performing a valve function (i. e. to promote the passage of current in one but not in both directions) to prevent backfeed.

Further objects of the invention will hereinafter appear.

For a better understanding of the invention reference may be had to the accompanying drawing forming a part of this application wherein—

Fig. 1 is a signal circuit embodying the invention;

Fig. 2 is an exploded view of a pilot lamp and associated device forming an element of the system, and

Fig. 3 is an assembled view of the latter.

Referring to the drawing, the invention is illustrated as embodied in a directional signal system for motor vehicles comprising a pair of lights 1 on the right side of the vehicle, and at the front and rear thereof, and a pair of signal lamps or lights 2 on the left side of the vehicle at the front and rear thereof. A combined magnetic and hot wire flasher unit is indicated at A, and a battery source of electricity is indicated at B. The flasher unit A embodies an electric coil 3, an armature 4 on one side and an armature 5 on the other. The armature 4 controls a pair of contacts 6 and is operated under the influence of two opposed forces, one force being a hot wire 7 and the other force being the electromagnetic pull of the coil 3. The armature 4 may also have a bias tending to close the contacts 6. When the hot wire 7 is cold it holds the contacts 6 open. The armature 5 controls a pair of contacts 8 and is biased against the pull of the electromagnetic coil 3 so as normally to hold the contacts 8 open unless and until the pull of the electromagnetic coil 3 is sufficient to overcome the bias of the armature 5.

The battery B is connected on one side with the ground and on the other side with a conductor 10 leading to a binding post 11 of the flasher unit. This binding post 11 is electrically connected with the armatures 4 and 5. The circuit through the armature 4 leads, with the contacts 6 open, through the hot pull wire 7 to the binding post 12 and from there through a resistance element 14. From the resistance element 14 the circuit leads through a conductor 15 and the coil 3 to a binding post 13. The binding post 13 is connected through a conductor 16 with a single pole double throw switch 17. The latter may be thrown by the operator to connect the conductor 16 with either of the pairs of signal lamps 1 and 2. By throwing the switch 17 to the right, connection is made with the conductor 18 which in turn is connected with the conductor 19, and this in turn leads to a conductor 20 connected with the signal lamps 1. By throwing the switch 17 to the left, connection is made with the conductor 21 which in turn is connected with the conductor 22 leading to the conductor 23 connected with the left hand pair of signal lamps 2. The other sides of the signal lamps 1 and 2 are grounded, as indicated.

The circuit from the battery B leads through the pilot lights 24 and 25 as follows: From the binding post 11 through the bridge 26, armature 5,

contacts 8 when closed, conductor 27, terminal or binding post 80 of the flasher unit, conductor 28 to the pilot lamp 24 and conductor 29 to the pilot lamp 25. Through the pilot lamp 24 the circuit leads through a one-way electrical passage element 30 and conductor 22 to the conductor 23 leading through the lamps 2 in parallel. Similarly, the circuit from the pilot lamp 25 leads through the one-way passage element 30 and conductor 19 to the conductor 20 and the lamps 1 in parallel.

The operation of the system is as follows:

When the operator desires to turn to the right the single pole switch 17 is thrown to the right to connect the conductors 16 and 18. Current then flows from the battery B through the armature 4, the hot pull wire 7, resistance 14, the conductor 15, the coil 3, the conductor 16, the conductor 18, the conductor 19 and the conductor 20 through the lamps 1. The latter are at first either not lighted at all or only dimly lighted because of the resistance 14 connected in circuit, but as soon as the hot wire 7 heats up sufficiently the pull of the electrical coil 3 acts on the armature 4 to close the contacts at 6, thereby short-circuiting the wire 7 and the resistance 14, whereupon the signal lamps 1 are lighed at full illumination. The wire 7 promptly cools and reopens the resistance short-circuit at the contacts 6, and thus flashing on and off of the signals 1 is continued until the switch 17 is opened. The pilot lamp 24 is also simultaneously flashed on and off through the operation of the armature 5 to open and close the contacts 8. For example, when the contacts 6 are closed the current flowing through the coil 3 due to the short-circuiting of the resistance 14 is sufficient to operate the armature 5 and thereby close the contacts 8, provided both signal lamps are burning, thereby causing current to flow through the armature 5, contacts 8, conductor 27, conductor 28, pilot lamp 24 and conductor 22 to the conductor 23 and thence through the signal lamps 2 in parallel. The current flowing through this circuit is sufficient to light the small pilot lamp 24 but insufficient to light the signal lamps 2. When the short-circuit is opened at the contacts 6, however, the bias of the armature 5 breaks the pilot lamp circuit at the contacts 8, the bias of the armature overcoming the pull of the electrical coil. The pilot lamp 24 is thus flashed on and off with the flashing of the signal lamps 1, indicating to the operator that the right hand signals are operating. The pilot light 25 is not lighted, being in shunt with the coil 3 when the contacts 6 and 8 are closed. If it is desired to operate the left hand signal lamps 2 the operator throws the switch 17 to the left, whereupon the circuit from the battery through the flasher is completed through the conductors 22 and 23 to the signal lamps 2 to flash these signal lamps on and off as described above with respect to the signal lamps 1. The plot lamp 25 is now flashed on and off with the signal lamps 2, as described above with respect to the pilot lamp 24 and the signal lamps 1, and the signal lamp 24 is now shunted by the coil 3 so as not to operate when the contacts 6 and 8 are closed. If one of the signal lamps fails, as for example one of the lamps 1 (with switch 17 thrown to the right), the current through coil 3 with only one lamp burning is insufficient to overcome the tension of spring biased armature 5 and the contacts 8 remain open. The pilot lamp 24 therefore receives no current from the flasher and by its failure to light indicates the failure of one of the signal lamps 1. Similarly with the switch 17 thrown to the left, the failure of either one or both of the lamps 2 is indicated by the failure of the pilot lamp 25 to light up, assuming the pilot lamp itself to be in order. When a signal lamp has burned out the flasher flashes at an accelerated rate due to the fact that a lower current flows through the pull wire 7 and it requires less time for the wire to cool.

The purpose of the valves or one-way electrical current passage elements 30 is to avoid a feed-back condition which would produce a slight but nevertheless objectionable illumination in both pilot lamps upon the failure of a signal lamp in the circuit operating. For example, assuming the switch 17 is thrown to the right to operate the right hand signal lamps 1, if one of the signal lamps 1 should fail or burn out not only would the pilot or indicator lamp 24 be illuminated and flashed, but also the indicator lamp 25 through a feed-back circuit as follows: The contacts at 8 remain open due to the insufficiency of the current flowing through the coil 3 to operate the armature 5, but there is a circuit none-the-less through the signal lamps 24 and 25 from the battery B, conductor 10, armature 4, contact 6, coil 3, conductor 16, switch 17, conductor 18, pilot lamp 25, conductor 28, pilot lamp 24 and conductor 22 out through the signal lamps 2 in parallel. Similarly, with the switch 17 thrown to the left to operate the signal lamps 2, if the circuit should be broken through one of the latter the current flowing in coil 3 is insufficient to close the contacts at 8, and under these conditions the feed-back circuit would be produced from the conductor 16, switch 17, conductor 21, conductor 22, pilot lamp 24, conductor 28, conductor 29, pilot lamp 25, conductor 19 and conductor 20 through the signal lamps 1 in parallel. The current flowing through the feed-back circuit including the pilot lamps 24 and 25 is sufficient to light these lamps to some degree of illumination, but insufficient to light up the signal lamps 1 or 2. The introduction of the one-way current devices 30 permitting current flow in only one direction prevents these feed-back circuit conditions which are confusing and misleading. The flashing of both pilot lamps simultaneous, if it occurred, would of course be at an accelerated rate as explained above with respect to the reduced current flowing through the pull wire 7. This objectionable lighting of both of the pilot indicator lights 24 and 25 under those conditions is avoided by the circuit including the one-way passage elements 30 being disposed in the circuit from the pilot lamps 24 and 25 and the corresponding conductors 20 and 23. The arrows over the elements 30 indicate the direction of permitted flow of current.

Any suitable valve or one-way conducting element 30 may be employed as a part of the novel and improved circuit of this invention, but I have found particularly suitable a one-way element comprising one or a series of so-called rectifier segments or couples, for example, segments consisting of magnesium and cupric sulphide (as for example, of separate washers), or copper and copper oxide (as for example, a copper washer oxidized on one side), etc., which are known to pass current in one direction but to prevent the back-flow of current. In Figs. 2 and 3 I have shown such an element formed as a unit with the lamp socket for the pilot indicator lamp 24 or 25. The socket comprises a cylindrical element 35 having a reduced end 36 in which reposes a com-

pression spring 37. An insulating disc 38 with a central opening rests upon the upper end of this spring and the upper end of the conductor 28 or 29 terminates in a contact element 39 for the center contact 40 of the bulb 24 or 25. The center contact 39 carried by the upper end of the conductor 28 or 29 bridges the central opening in the disc 38, not shown for convenience in illustration. The assembly for the socket member 35 comprises three superposed insulating discs 41, 42 and 43 held together by the screw bolts 44. Between the discs 41 and 42 is disposed a metallic disc ring 45 surrounding the opening formed in the insulating disc 42 accommodating the bulb socket. This ring 45 has a part 45' doubled back on itself, and from the latter are formed integral spring fingers or tongues 46 surrounding the bulb 24 or 25. The rectifying segment or one-way passage element for the electricity comprises a copper disc 47 having formed thereon a copper oxide film 48. A flange 35' formed on the socket 35 engages the oxide film 48 of the copper disc 47, and the electrical connection between the lamp and the copper disc is formed through the connection of the outer metallic shell 49 of the lamp plug with the socket 35, 35' and the oxide film 48. The underside of the copper disc 47 is in engagement with a metallic washer 50 such for example as of copper, and the latter has a connection 51, which in the case of the lamp 24 connects with the conductor 22 and in the case of the lamp 25 connects with the conductor 19. The flange 35', the copper disc 47 and the metallic disc 50 are firmly clamped together between the insulating discs 42 and 43. As above indicated, the one-way electrical passage or valve action may be obtained through the use of any device suitable for the purpose as, for example, any device utilizing copper with copper oxide or magnesium with cupric sulphide or any other disc valve or rectifier couple utilizing a combination of any electro-negative element with any electro-positive element known to provide a rectifier segment or couple of the desired characteristics. The lamp bulb 24, 25 is fastened within the socket by the conventional bayonet joint (not shown for convenience). The assembly unit shown in Fig. 3 is mounted in the dashboard 55 from the back, the spring fingers 46 of the unit being snapped into the opening formed in the dash 55. The bulb may be inserted afterwards. In the particular embodiment shown, the oxide film side 48 of the rectifier is connected through the shell 49 of the bulb and thence through the filament and conductors 28 and 29 with the positive side of the battery source, but if the battery is reversed with the positive side grounded it is understood, of course, that the valves 30 would need to be reversed. Similarly, with a magnesium and cupric sulphide rectifier couple the positive side of the source should be connected with the sulphide element.

The system thus shown provides for unmistakable indication of signal lamp failure and pilot light indication of the exact character required by the industry. The pilot lamps are operated at full illumination and the system and all of its elements may be easily and permanently installed in ordinary automotive production line assembly with the assured strength and rigidity of mount necessary to withstand the vibration encountered in automotive circuits.

I claim:

1. In a directional signal system for motor vehicles the combination of right and left signal lamps for the front and rear, a pair of pilot lamps, a flasher unit controlling two pairs of contacts, a source of electric current, circuits for connecting each pair of the right and left signal lamps in parallel, a single pole double throw switch for connecting one of said pairs of contacts of the flasher with either of said parallel circuits, a circuit leading from the other pair of contacts controlled by the flasher to the pilot lamps, one of said pilot lamps being connected on one side with the circuit of the right-hand signal lamps and the other of the pilot lamps being connected on one side with the left-hand signal lamps, and means in the circuit of each of the pilot lamps leading to the signal lamp circuit permitting flow of current only in one direction.

2. In a directional signal system for motor vehicles the combination of right and left signal lamps for the front and rear, a pair of pilot lamps, a flasher unit controlling two pairs of contacts, a source of electric current, circuits for connecting each pair of the right and left signal lamps in parallel, a single pole double throw switch for connecting one of said pairs of contacts of the flasher with either of said parallel circuits, a circuit leading from the other pair of contacts controlled by the flasher to the pilot lamps, one of said pilot lamps being connected on one side with the circuit of the right-hand signal lamps and the other of the pilot lamps being connected on one side with the left-hand signal lamps, and means in the circuit of each of the pilot lamps leading to the signal lamp circuit permitting flow of current only in one direction, said means comprising a rectifier segment of the group consisting of a cupric sulphide washer and magnesium washer and a copper oxide and copper washer.

3. In a directional signal system for motor vehicles, a plurality of signal lamps, a source of current, a single pole, double throw switch, circuit connections between the fixed terminals of said switch and said signal lamps, an automatic control device between said source and the movable element of said switch, a circuit bypassing said control device and connecting said source with the fixed terminals of said switch, a pilot lamp in said last mentioned circuit, means controlled by said device for opening and closing said last mentioned circuit and means in said last mentioned circuit for preventing flow of current from one fixed terminal of said switch to the other fixed terminal thereof.

4. In a signal system of the character set forth, a flasher unit controlling two pairs of contacts and having three terminals, a source of electric current connected to one of said terminals, a single pole double throw switch the movable element of which is connected with another of said terminals, one of said pairs of contacts controlling the flasher unit resistance between said last mentioned terminals, two groups of signal lamps, two pilot lamps each connected in circuit between the third terminal of said unit and a different one of said groups of signal lamps, said other pair of contacts controlling connections between the terminal connected to said source and the terminal connected with said pilot lamps, and a connection between each group of signal lamps and a fixed terminal of said switch.

5. In a signal system of the character set forth, a flasher unit controlling two pairs of contacts and having three terminals, a source of electric current connected to one of said terminals, a single pole double throw switch the movable element of

which is connected with another of said terminals, one of said pairs of contacts controlling the flasher unit resistance between said last mentioned terminals, two groups of signal lamps, two pilot lamps each connected in circuit between the third terminal of said unit and a different one of said groups of signal lamps, said other pair of contacts controlling connections between the terminal connected to said source and the terminal connected with said pilot lamps, and a connection between each group of signal lamps and a fixed terminal of said switch, including means associated with each of said pilot lamps for permitting flow of current only in one direction whereby when said switch is closed to connect one of said groups of signal lamps with the flasher unit, current will not flow from said switch through the pilot lamps in series to the other group of signal lamps.

6. In a directional signal system for motor vehicles, two groups of signal lamps, a single pole, double-throw switch having opposite terminals connected to said groups, a source of current, a flasher device connected between said source and the movable element of said switch, a pair of pilot lamps each connected to a different one of the terminals of said switch, a common circuit connection between said pilot lamps and said source and a pair of contacts in said connection controlled by said flasher device whereby when said switch is closed to flash one group of signal lamps, current flows from said source through said connection, through one of said pilot lamps to the other group of said signal lamps to flash said last mentioned pilot lamp.

7. In a directional signal system for motor vehicles, the combination of right and left signal lamps both for the front and rear of the vehicle, a pair of pilot lamps, a flasher unit controlling two pairs of contacts, a source of electric current, circuit connections for connecting each pair of the right and lefthand signal lamps in parallel, means for connecting said flasher with either of said parallel circuits, a circuit leading from one pair of contacts controlled by the flasher to the pilot lamps, one of said pilot lamps being connected on one side with the circuit of the righthand signal lamps and the other of the pilot lamps being connected on one side with the lefthand signal lamps, and means in the circuit of each of the pilot lamps leading to the signal lamp circuit permitting flow of current only in one direction.

8. In a directional signal system for motor vehicles, the combination of right and left signal lamps for both the front and rear, a pair of pilot lamps, a flasher unit, a source of electric current, circuits for connecting each pair of the right and left signal lamps in parallel, means for connecting said flasher with either of said parallel circuits, the coil of said flasher controlling a pair of contacts and operative to close said contacts when both of a pair of front and rear lights are operating, a circuit leading from said pair of contacts on one side with the circuit of the righthand signal lamps and the other of the pilot lamps being connected on one side with the lefthand signal lamps and means in the circuit of each of the pilot lamps leading to the signal lamp circuit permitting flow of current only in one direction.

9. In a directional system for motor vehicles, the combination of right and left signal lamps for both the front and rear, a pair of pilot lamps, a solenoid controlling a pair of contacts, a source of electric current, circuits for connecting each pair of the right and left signal lamps in parallel, means for connecting said solenoid with either of said parallel circuits, a circuit leading from said pair of contacts to the pilot lamps, one of said pilot lamps being connected on one side with the circuit of the righthand signal lamps and the other of the lamps being connected on one side with the lefthand signal lamps, said solenoid being inoperative to close said contacts when one of a pair of signal lamps is burned out, and means in the circuit of each of the pilot lamps leading to the signal lamp circuit permitting flow of current only in one direction.

10. In a system of the character set forth, a source of current, a single pole double-throw switch, electrical loads connected to opposite terminals of said switch, a control device connected between said source and the movable element of said switch, circuits connected to opposite terminals of said switch, a connection between said circuits and said source, said connection including contacts controlled by said control device and maintained open thereby under certain conditions, means in each circuit for permitting current flow therethrough in one direction only and an indicating device in each of said circuits.

RALPH B. KENNETT.