United States Patent [19]

Dressayre

[11] **3,786,414**

[45] **Jan. 15, 1974**

[54] **FAIL SAFE CONTROL CIRCUIT FOR TRAFFIC LIGHTS**

[75] Inventor: **Jean Dressayre**, Orsay-Essones, France

[73] Assignee: **U.S. Philips Corporation**, New York, N.Y.

[22] Filed: **Mar. 19, 1971**

[21] Appl. No.: **126,338**

Related U.S. Application Data

[63] Continuation of Ser. No. 776,467, Nov. 18, 1968, abandoned.

[52] **U.S. Cl.** **340/78**, 340/41, 340/46, 340/251, 340/419,

[51] **Int. Cl.** **G08g 1/097**

[58] **Field of Search** 315/121, 312–315; 328/94, 340/22, 41–46, 78, 176, 248, 251, 328/286, 332, 419

[56] **References Cited**

UNITED STATES PATENTS

3,423,745	1/1969	Williams	340/176
2,486,599	11/1949	Hollins	340/80 UX
2,803,815	8/1957	Wulfsterg	340/176 X
3,241,113	3/1966	Sobotta et al.	340/78

FOREIGN PATENTS OR APPLICATIONS

758,337	11/1933	France	340/286
1,282,615	12/1961	France	340/80

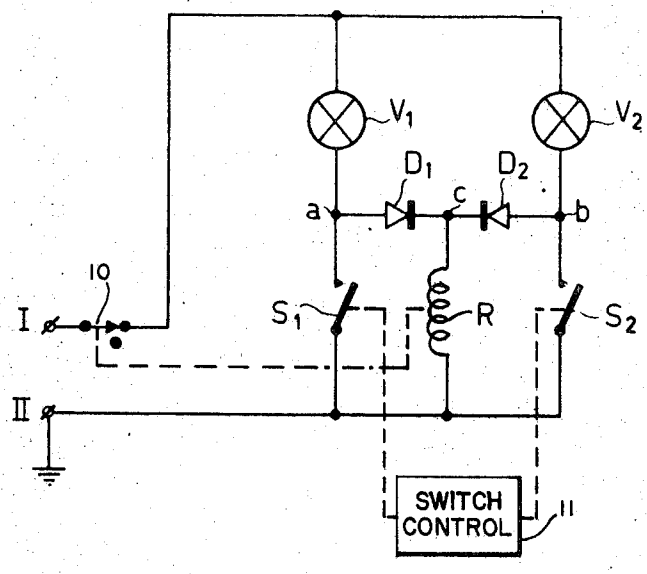
Primary Examiner—Kenneth N. Leimer

Attorney—Frank R. Trifari

[57] **ABSTRACT**

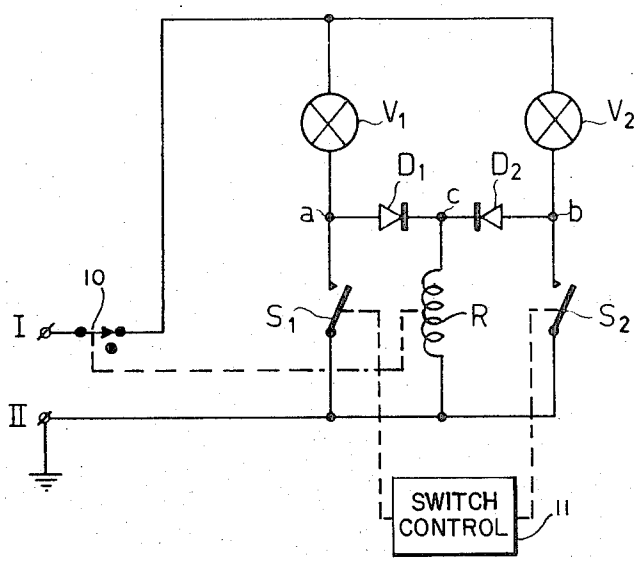
A circuit for preventing the simultaneous energization of first and second signal lamps includes first and second relay contacts connected in series with said first and second lamps, respectively, across a source of voltage. A pair of diodes are connected in series opposition between the common junction points of the lamps and contacts. A high-ohmic relay coil is connected between the junction of the diodes and one terminal of the voltage source.

9 Claims, 1 Drawing Figure



PATENTED JAN 15 1974

3,786,414



INVENTOR.
JEAN DRESSAYRE
BY
Fiand R. Dressaire
AGENT

FAIL SAFE CONTROL CIRCUIT FOR TRAFFIC LIGHTS

This application is a continuation of U.S. Pat. application Ser. No. 776,467, filed Nov. 18, 1968, and now abandoned.

This invention relates to a device for guarding signal line conditions excluding each other, more particularly, to a device for preventing two green signal lamps positioned at a crossing of two roads from operating simultaneously. This device comprises two green signal lamps connected through a common terminal to the output terminal of a supply source and through another terminal each via a switching contact to a second output terminal of the supply source, and a high-ohmic relay which is coupled to the two other terminals.

A circuit of this kind is shown in U.S. Pat. No. 3,241,113 in which the relay is connected between the said other connecting terminals.

Since the device must become operative only if both green signal lamps are simultaneously in operation, a second relay is required which must be energized through a back contact of the first relay. Also, the device requires at least a third contact which must be actuated simultaneously with one of the other contacts. However, this circuit has the disadvantage that in the case of a short-circuit across the other two contacts, both green signal lamps are lit, but the second relay will not be energized so that a green signal light will be operating at each of the two roads crossing each other.

It will also be impossible to ascertain a disturbance occurring in the circuit of the second relay, such as a short-circuited or interrupted winding of the second relay or dust between the contacts of the third contacts, etc. before a second error occurs due to the ignition of the two green signal lamps. In this case too, the two green lamps will remain in operation.

The present invention obviates these disadvantages and is characterized in that two diodes connected in series opposition are included between the other terminals of the lamps and that between these diodes a terminal of the relay is connected. The relay is connected via a second terminal to the second terminal of the supply source.

In order that the invention may readily be carried into effect, one embodiment thereof will now be described in detail, by way of example, with reference to the accompanying diagrammatic drawing, the sole FIGURE of which shows a preferred embodiment of the invention.

The green signal lamps V_1 and V_2 are connected in series with tappings *a* and *b*, respectively, and contacts s_1 and s_2, respectively, between a terminal I and a ground terminal II of a supply source (not shown) which may be either a direct voltage source or an alternating voltage source. Two diodes D_1, D_2 are connected in series-opposition between the points *a* and *b*. These diodes are connected together at point *c* and connected to a terminal of a relay R which is coupled via another terminal to the terminal II of the supply source, not shown. Relay R has a contact **10** connected in one supply line for the lamps V_1 and V_2. A conventional switch control device **11** operates contacts S_1 and S_2 in mutually exclusive time intervals.

The circuit operation is as follows:

If the contacts s_1 and s_2 are open, the high-ohmic relay R with the contacts s_1, s_2 open, is energized on the one hand through the green signal lamp V_1 and the diode D_1 and on the other hand through the green signal lamp V_2 and the diode D_2. The resistance of the winding of relay R has been chosen to have a value such that the green signal lamps V_1 and V_2 are not lit. When one of the contacts, for example, s_1 is closed, the green signal lamp V_1 will be switched on. The relay R remains energized through the signal lamp V_2 and the diode D_2 since the diode D_1 cuts-off.

If, as a result of a defect, the other contact s_2 also should be closed, then both green signal lamps V_1 and V_2 would operate. This is prevented, however, by short-circuiting of the relay R, which is thus de-energized. The relay R interrupts, for example, the supply line of the green signal lamps and switches-on the yellow or orange flashing lights. Similarly, in the event of a short-circuit across the contacts s_1 and s_2, it will be possible to prevent operation of both green signal lamps V_1 and V_2, since in this case also the relay R is de-energized. The chance of short-circuit across the contacts s_1 and s_2 is a real one if they are designed as semiconductor elements, for example, thyristors.

If one of the green signal lamps or one of the fuses which may be connected in series therewith should be defective, then the alarm will also become operative when the other green signal lamp is switched in.

Furthermore this circuit immediately responds to an interruption of the voltage supply to the relay R, for example, due to short-circuit or interruption of the supply leads, etc. even if both contacts s_1 and s_2 are open.

What is claimed is:

1. A fail-safe circuit for preventing the simultaneous energization of a pair of signal lamps comprising, a source of supply voltage having first and second output terminals, first and second switching contacts, means for alternately closing said contacts in mutually exclusive time intervals, means connecting a first one of said lamps and said first switching contact in a first series circuit across said first and second output terminals in the order named and the second one of said lamps and said second switching contact in a second series circuit across said first and second output terminals in the order named and in parallel with the first series circuit, first and second diodes, a relay having a high value of resistance, means connecting said diodes in series opposition between the junction of said first lamp and the first contact and the junction of the second lamp and the second contact, and means connecting said relay between the junction of said diodes and said second output terminal of the voltage source, said diodes being polarized relative to the voltage at said output terminals so that when one contact is closed the relay is energized via the lamp that is in series with the open contact and its associated diode.

2. A circuit as claimed in claim **1** wherein one terminal of each said lamps is directly connected to said first output terminal and one terminal of each of said contacts is directly connected to the second output terminal, and one terminal of said relay is directly connected to the second output terminal so that the relay is in shunt with the series combination of one diode and one switching contact and the series combination of the other diode and the other switching contact.

3. A circuit as claimed in claim **1** wherein said relay is normally energized by a current flow from said voltage source via a first series circuit including said first lamp and the first diode when the second contact is closed or via a second series circuit including the sec-

ond lamp and the second diode when the first contact is closed.

4. A circuit as claimed in claim 1 wherein said diodes are connected with their cathodes in common to one terminal of the relay.

5. A fail-safe circuit for preventing the simultaneous energization of a pair of signal lamps comprising, a source of supply voltage having first and second output terminals, first and second switching contacts arranged to close alternately in mutually exclusive time intervals, means connecting a first one of said lamps and said first switching contact in a first series circuit, means connecting the second one of said lamps and said second switching contact in a second series circuit, means connecting said first and second series circuits in parallel across said output terminals with one terminal of each lamp connected in common to said first output terminal and with one terminal of each switching contact connected in common to said second output terminal, first and second diode connected in series opposition between the junction of said first lamp and the first contact and the junction of the second lamp and the second contact, and a relay coil connected between the junction of said diodes and said second output terminal of the voltage source.

6. A circuit as claimed in claim 5 wherein said relay coil is normally energized by said voltage source and includes a contact arranged to interrupt the supply of voltage from the output terminals to the lamps whenever the relay coil is deenergized.

7. A circuit as claimed in claim 5 wherein the resistance of said coil is chosen to have a value sufficient to develop a voltage drop that will back-bias the diode associated with a closed contact whereby the relay stays energized despite the closure of one of said contacts.

8. A fail-safe circuit for preventing the simultaneous energization of a pair of signal lamps comprising, a source of supply voltage having first and second output terminals, first and second switching contacts arranged to close alternately in mutually exclusive time intervals, means connecting a first one of said lamps and said first switching contact in a first series circuit, means connecting the second one of said lamps and said second switching contact in a second series circuit, means connecting said first and second series circuits in parallel across said output terminals with one terminal of each lamp connected in common to said first output terminal and with one terminal of each switching contact connected in common to said second output terminal, first and second diodes connected in series opposition between the junction of said first lamp and the first contact and the junction of the second lamp and the second contact, and a relay coil connected between the junction of said diodes and said second output terminal of the voltage source, said diodes being polarized relative to the voltage at said output terminals to provide an easy path for current to flow from said terminals to the relay coil via a series circuit comprising that lamp which is in series with the open one of said contacts and its associated diode, said current being of a magnitude to energize said relay independently of the state of the other one of said contacts.

9. A circuit as claimed in claim 8 wherein the resistance of said coil is chosen to have a value sufficient to develop a voltage drop such that said relay coil can only be deenergized in the event that both contacts are closed at the same time or that a signal lamp burns out.

* * * * *

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,786,414 Dated January 15, 1974

Inventor(s) JEAN DRESSAYRE

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

IN THE CLAIMS

col. 2, line 55, after "each" insert -- of --;

Signed and sealed this 8th day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents