Aug. 17, 1965 JITSUO HANANO 3,201,643

ELECTRIC CIRCUIT FOR DIMMING VEHICLE LIGHTS

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Fig 1

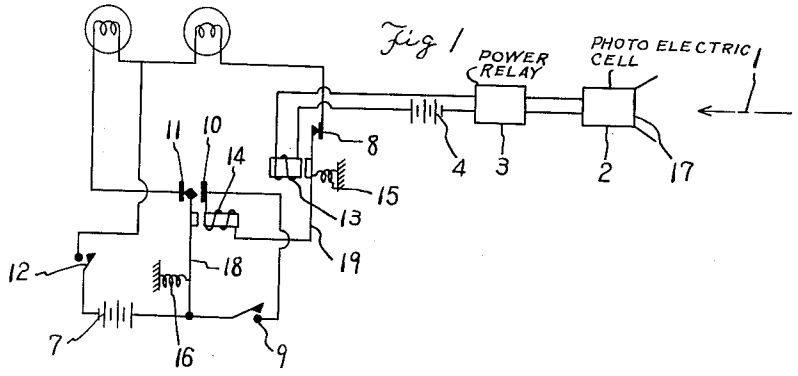


Fig 2

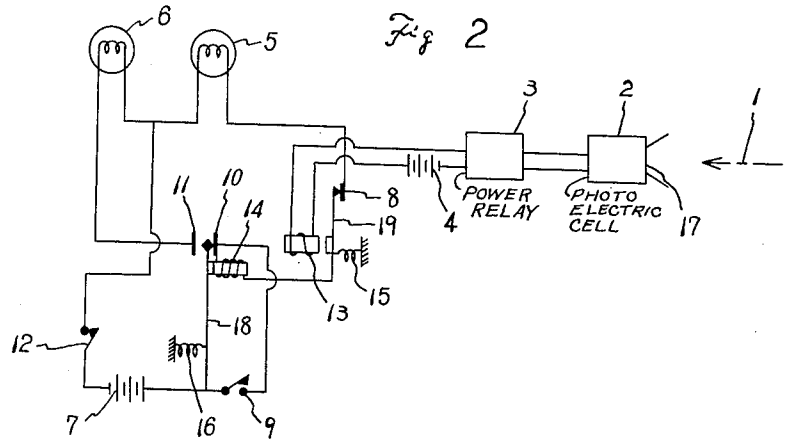
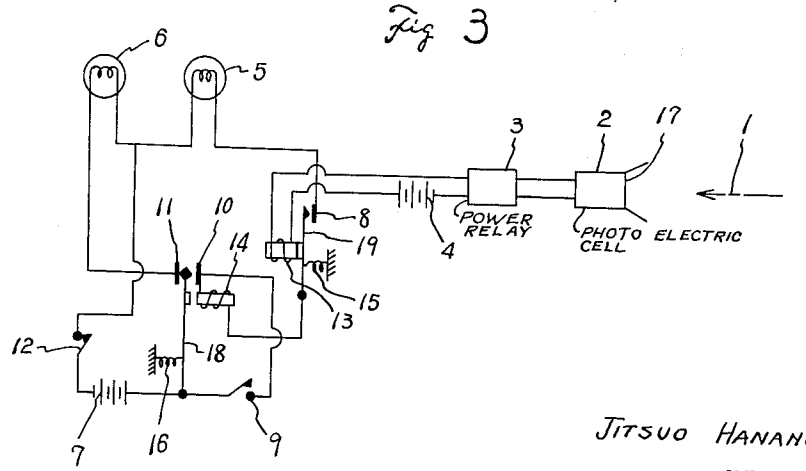


Fig 3



JITSUO HANANO,
INVENTOR.

BY Hall & Houghton
Attorney.

United States Patent Office

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ELECTRIC CIRCUIT FOR DIMMING VEHICLE LIGHTS

Jitsuo Hanano, 3 2-chome, Ohike-cho, Suma-ku, Kobe-shi, Hyogoken, Japan

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This invention relates to an electric circuit for selecting the proper headlight beam of an automobile, a motorcycle or other vehicles when vehicles approach from the opposite direction.

There will be a danger of causing traffic accidents if drivers are blinded by a strong beam or an upper beam of the other car travelling in the opposite direction. To avoid accidents, drivers must actuate the switch of the headlight from upper to lower beam. But drivers do not always do this due to their inattention or negligence. To prevent accidents caused by such inattention, electric devices controlled by photosensitive means are used which automatically shift the headlight from upper to lower beam when other cars approach from the other direction and shift it back to the upper beam when the car has passed.

When such automatic devices are used, the shifts of the beams will occur too frequently when many cars approach successively, and then driving will become very difficult, due to the rapid and continual readjustments which the driver must make to the changing lighting conditions.

To overcome this difficulty, only the shift from upper to lower beam is automatically operated and the shift back to the upper beam is done manually in this invention.

An object of the invention is to provide an electric circuit which comprises a light sensitive plate such as a phototube or a photocell which releases an electric current, a power relay and switches which switch the high filament out of the circuit and switch the low filament into the circuit automatically but their reverse switching is done by hand.

More details and practical embodiments of the invention will be shown in the accompanying drawings in which:

FIG. 1 is a schematic diagram of an electric circuit showing its state in the daytime in which both beams are switched out.

FIG. 2 is a diagram showing a state in which a current flows through only the high filament.

FIG. 3 is a diagram showing a state in which a current flows through only the low filament.

A top portion of a car is provided with a light sensitive device **2** which has a light sensitive plate **17** such as a photocell or a phototube. The light sensitive device **2** is connected to an electromagnet **13** through a power relay **3** and a battery **4** as a D.C. source to operate the magnet **13**. The electromagnet **13**, a switch blade **19**, a spring **15** and a contact **8** form an electromagnetic switch. The contact **8**, a high filament **5**, a low filament **6** and a contact **11** are connected with each other in series. The switch blade **19**, a contact **10**, an electromagnet **14**, a hand or foot switch **9**, a battery **7**, providing a current source for the filaments, and a switch **12** are connected in series with the high filament **5**. The other side of the switch **12** is connected to both the high **5** and the low **6** filaments. A switch blade **18** provided with a spring **16** is mounted between the battery **7** and the switch **9**. The switch blade **18** is thrown between the contacts **10** and **11** by forces of the spring **16** and the electromagnet **14**.

In the daytime as shown in FIG. 1, the switches **12**, **9** and contact **10** are opened and the light sensitive plate is covered with a shield (not shown). Accordingly no current will flow in any of the circuits.

At night the circuit will be in the condition as shown in FIG. 2. First, the switches **12** and **9** are closed and a current flows from the battery **7** through the switch **9**, the coil of the electromagnet **14**, the switch blade **19**, the contact **8**, the high filament **5** and the switch **12**. The shield on the light sensitive plate **17** is removed but light intensity at night is not enough to operate the light sensitive device and the power relay **3** remains opened. Accordingly the electromagnet **13** is not energized and the contact **8** remains closed. When a current flows through the coil of the electromagnet **14** the switch blade **18** will be thrown in the direction of the magnet **14** against the tension force of the spring **16**, to open the contact **11** and to close the contact **10**. In this state, even if the switch **9** is opened (as shown in FIG. 2) by removing the force to close it, a current flows through the contact **10** to light the upper beam of the headlight. The opening of the contact **11** will cause switching out of the low filament **6**.

When a car approaches from the other direction and its headlight of high intensity strikes the light sensitive plate **17**, as shown in FIG. 3, a current will be released to operate the power relay **3** and the circuit of the electromagnet **13** will be closed. The magnet **13** thus energized will throw the switch blade **19** in the direction of the magnet **13** against the force of the spring **15** and then the contact **8** will be opened. At this time, the circuit of the high filament **5** is opened, the strong headlight beam is switched out, the electromagnet **14** is deenergized, the switch blade **18** will be thrown against the contact **11** to close the circuit of the low filament and a weaker headlight beam will be switched in. When the car has passed, the light sensitive device **2** becomes inactive, the power relay **3** will be opened to cause deenergizing of the electromagnet **13** and the contact **8** will then be closed. If an operator does not close the switch **9** a current continues to flow through the low filament **6** and does not flow through the high filament **5**. If he desires to shift the light from lower to upper beam, he must close the switch **9** by hand or foot. Once a current flows through the circuit of the high filament **5** by closing of the switch **9** the contact **11** will be opened and the contact **10** will be closed even if the switch **9** is opened, as shown in FIGURE 2.

Thus the circuit returns back to the state of FIG. 2 and is ready to operate for next approaching cars.

This invention will greatly serve for safety in traffic by its automatic shift from upper to lower beam to prevent accidents caused by a driver who fails to shift the headlight beams. Furthermore, even when many cars successively come in opposite direction too frequent shifts of the beams will not occur owing to providing a manipulative means to return back to the strong beam.

There could be a problem when two cars with different intensities of their headlight beam approach each other and only the weaker beam will shift and the stronger beam will remain strong. But such inconvenience does not occur owing to the existence of a time interval between the time of the light striking and the time the switching of beams actually occurs in this electric device. When such two cars approach each other, the car with a weaker light approaches the other car during this time interval and is thus able to strike the light sensitive device of the car with a stronger light.

When a car enters a bright area such as a busy street the upper beam will continue to be switched out.

As mentioned above, this invention is very convenient for the operation of cars.

What I claim is:

1. An electrical circuit device for use in vehicles and the like, comprising, in combination:

a source of electrical energy;

a high filament and a low filament;

circuit means, including manually actuable switch means, for connecting said filaments with said energy source and including

filament control means including a light sensitive means for controlling said circuit into a condition in which said high filament is disconnected from said source and said low filament is connected to said source when light of a predetermined intensity reaches said light sensitive means and for retaining said circuit in this condition ever after said light sensitive means ceases to detect light of the predetermined intensity, said filament control means comprising first means, including an electromagnet, for holding said high filament connected to said source upon actuation of said manually actuatable switch means until disconnection by said light sensitive means, a two position switch for connecting said low filament with said source in one position and for connecting said high filament with said source when in the other position, and a device for biassing said two position switch toward said one position, said electromagnet being capable of holding the two position switch in said other position by magnetic attraction.

2. An electrical circuit device for use in vehicles and the like, comprising, in combination:

(a) a source of electrical energy,

(b) a high filament and a low filament,

(c) circuit means for connecting said high and low filaments with said energy source, said circuit means including a two-position switch for connecting said low filament with said source when in one position and for connecting said high filament with said source when in the other position, said circuit means further including

(1) filament control means, including light sensitive means, for controlling said circuit into a condition in which said high filament is disconnected from said source and said low filament is connected to said source when light of a predetermined intensity reaches said light sensitive means, and for retaining said circuit in this condition even after said light sensitive means ceases to detect light of the predetermined intensity, said filament control means including a first relay contact connected in circuit with said high filament and said source, an electromagnet connected to be operated by said light sensitive means for controlling said first relay contact and opening it when said light of a predetermined intensity is detected, and a device for biassing said two-position switch in said one position;

(2) manually actuable switch means counteracting the retaining action of said filament control means for connecting said high filament with said source; and

(3) means for holding said high filament connected to said source upon actuation of said manually actuable switch means until disconnection by said light sensitive means, said holding means including an electromagnet for holding, by magnetic attraction, said two-position switch in said other position.

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GEORGE N. WESTBY, *Primary Examiner.*

ARTHUR GAUSS, RALPH G. NILSON, *Examiners.*