

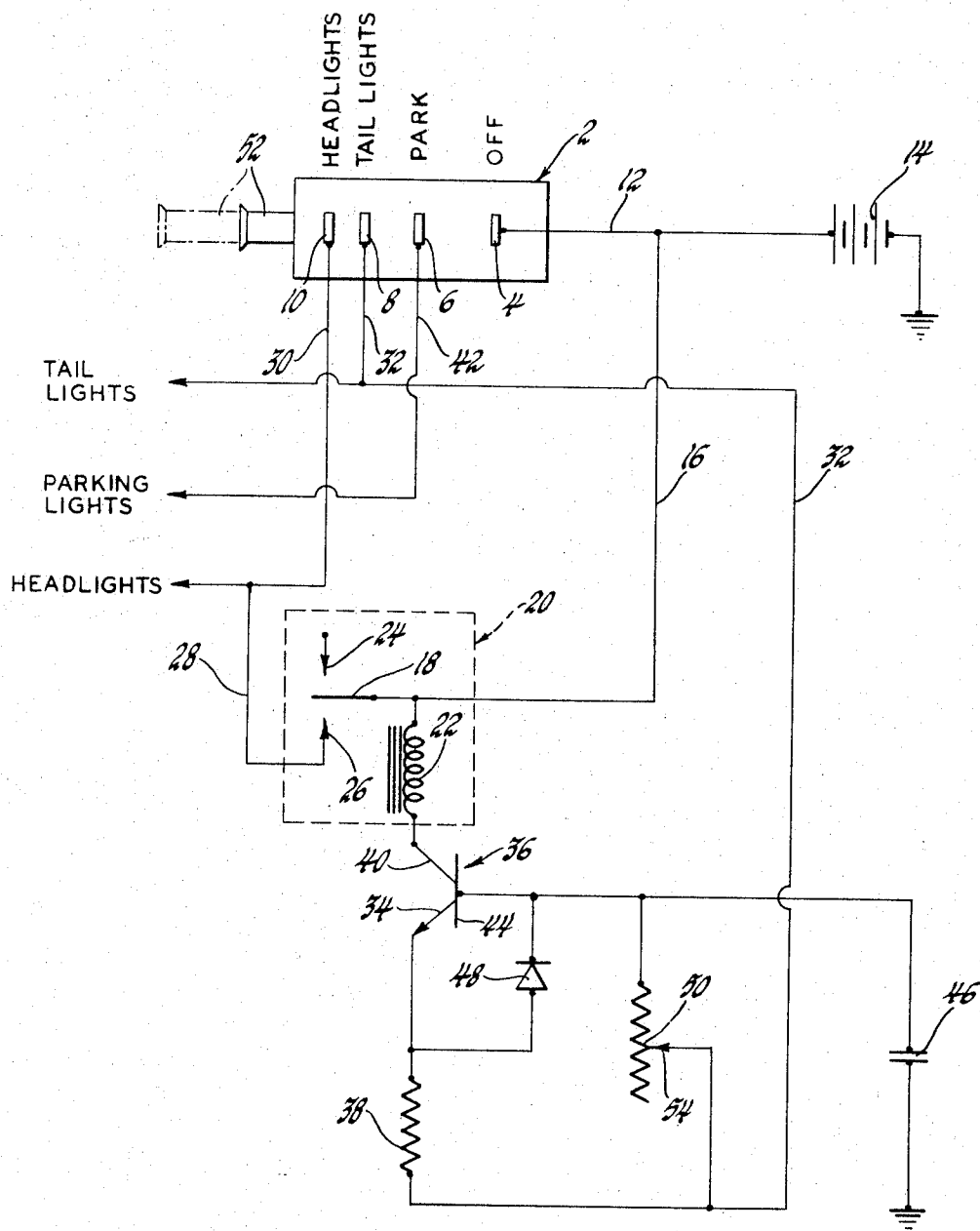
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TIME DELAY CONTROL FOR LIGHTING CIRCUIT

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TIME DELAY CONTROL FOR LIGHTING CIRCUIT
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ABSTRACT OF THE DISCLOSURE

A lighting circuit incorporating a relay, a transistor switch, and an RC timing network that together become operative when the light switch is moved to its "Off" position to provide a shunt connection between the headlamps and the power source. The RC network biases the transistor switch on and causes the relay to be energized to complete the shunt connection for a certain time interval determined by the time constant of the RC network.

This invention relates to control means for a lighting circuit and more particularly to time delay control means for a lighting circuit of an automotive vehicle which maintains certain lights energized for a given predetermined time period after the main control switch is placed in the "Off" position. This enables the operator to reach a remote point before total darkness engulfs the area.

Automotive vehicles are frequently parked after dark in poorly lighted or remote areas following which the operator must go some distance before reaching an illuminated area. From a standpoint of safety, both to see obstacles in one's path and to keep away malicious persons, it would be an advantage to retain the immediate area in which the car is parked illuminated for a short time allowing the operator to reach his objective.

It is, therefore, an object in making this invention to provide a control circuit to maintain the headlamps of an automotive vehicle energized for a predetermined time after the normal control switch is moved to "Off" position.

It is a further object in making this invention to provide a simple accessory circuit which can easily be attached to a conventional lighting system of a vehicle and which will then maintain the headlamps energized for a predetermined time after the headlamp switch is turned off.

With these and other objects in view which will become apparent as the specification proceeds, my invention will be best understood by reference to the following specification and claims and the illustrations in the accompanying drawings, in which:

The figure is a circuit diagram of a time delay accessory headlamp control system embodying my invention.

There are currently available on most automatic vehicles light switches usually mounted on the left side of the instrument panel. These are axially movable to different positions to turn the various sets of vehicle lights on and off. As the switch shaft is moved outwardly the 12-volt power supply is sequentially connected to different terminals for parking lights and then headlamps and tail-

lamps. Such a light switch is shown generally on the drawings at 2 and there are shown terminals 4, 6, 8 and 10 which will be engaged by the movable armature as the light switch is pulled out from the dash. These contacts or terminals are connected to various lighting circuits for energization as will be explained. First, contact 4 is connected directly through line 12 to the power source or battery 14, the other terminal of which is grounded. Line 12 is also connected through tie line 16 with the movable armature 18 of a relay 20. One terminal of the

operating coil 22 of the relay is also connected to this line. The movable armature 18 oscillates between two stationary contacts 24 and 26, being spring biased upwardly against contact 24 and pull down into engagement with the lower contact 26 when the coil 22 is energized. The upper stationary contact 24 is unconnected to any other part of the circuit and merely acts as a stop. Lower contact 26 is connected through tie line 28 to conductor 30 which extends from contact 10 on the main headlight switch to the headlight circuits.

Contact 8 of the main lighting switch 2, which controls the energization of the taillights, is connected through conductor 32 and series resistor 38 to emitter 34 of the control transistor 36. Collector 40 of transistor 36 is connected directly to the lower terminal of the operating coil 22 of relay 20. Terminal 6 of the lighting switch 2 is connected through conductor 42 to the parking light circuit. The base electrode 44 of transistor 36 is connected to ground through condenser 46. Diode 48 is connected directly across the emitter-base electrodes of transistor 36 and variable resistance 50 is connected between the base electrode 44 and conductor 32.

The system operates in the following manner. With the switch plunger 52 in the innermost or "Off" position as shown in full lines in the figure, no voltage from the battery is applied to any of the contacts on terminals 6, 8 or 10 and the lights are all off. Line 16 is at the full supply voltage which is approximately +12 volts with respect to ground. Line 32 is connected to ground through the taillight filaments. There is no charge across capacitor 46 and, therefore, the base is substantially at ground as well as the emitter and no current is flowing through the transistor. The relay armature will, therefore, not be attracted and will be in its upper position against the stop 24. When the switch plunger 52 is pulled out to the first position, voltage is applied to the terminals 6 and 8 and the parking lights and taillights are energized through obvious circuits. Line 32 now has the line voltage or +12 volts supplied thereto, which voltage is now applied to the emitter 34 and base 44 of the transistor 36 and they are, therefore, at the same potential as the collector 40 to which +12 volts is applied through line 16. Under these conditions the transistor will not conduct.

The capacitor 46 will now be charged to +12 volts through the small resistor 38 and the diode 48. As long as no current flows through the relay coil 22 it will not attract its armature and the same will remain against the upper contact 24. At this point only the parking lights and taillights are energized and the condenser 46 is charged. When the headlamp switch is moved to the outermost position the parking lights are de-energized and now both the taillights and headlights are energized since voltage is applied to terminals 8 and 10. This does not produce any change in the transistor circuitry since voltage was applied thereto through line 32 and it is still applied from contact 8 thereto. The condenser 46, therefore, remains charged and the transistor is off.

The car is operated until such time as the driver reaches a location in which he desires to park. The plunger switch 52 is moved from the outermost or headlight position through the park position to the off position. At this point the terminals 6, 8 and 10 are all disconnected from any source of power and all of the lights directly fed by these power sources are de-energized including the headlights. There is, however, an auxiliary circuit to the headlights only, which is from the battery 14 through line 16, armature 18, contact 26, line 28 to the headlight filaments. This circuit is completed substantially instantaneously when the taillight circuit is broken at terminal 8 as the switch is pushed inwardly by line 32 going immediately to ground. This applies ground potential to the emitter elec-

trode 34. However, the base electrode 44 is still held at +12 volts due to the charge on the capacitor 46. The transistor 36 will, therefore, conduct and relay coil 22 will be energized attracting armature 18 to engage contact 26. This completes the auxiliary circuit to the headlights and these will remain energized until the charge on the condenser 46 has leaked off through the potentiometer 50 to ground on line 32.

At the time the base 44 returns to ground, the transistor stops conducting releasing the relay 20 and turning off the headlights. This system provides one which requires no additional concern on the part of the operator, who merely operates his lighting control switch in the same manner that he would ordinarily do but when he does so he is provided with a time delay period during which his headlamps alone remain energized so that he can move from the area of the vehicle either into a house or other dwelling before the area becomes darkened. The time interval during which the headlamps remain energized is determined by the time period required to discharge the condenser 46. This is in turn determined by the setting on the potentiometer 50, by moving the adjustable tap 54 over the surface so that either longer or shorter time periods may be obtained.

What is claimed is:

1. In a control system, a source of electrical power, a load, switching means operative when closed to connect the source of electrical power to the load to primarily control the energization of said load, circuit means interconnecting the source of electrical power with the load including relay switching means, and capacitor means connected to the first-named switching means and to the relay switching means so that the capacitor means becomes charged by the source of electrical power during control of the load by the first-named switching means and then discharges while controlling the energization of the relay switching means when the first-named switching means is opened so as to maintain the energization of the load through the circuit means for a predetermined time interval until discharged.

2. In a control system for the head and taillamps on an automotive vehicle, a source of electrical power, a lighting switch for controlling the head and taillamp energization connected to the source of electrical power and to the head and taillamps, a shunt circuit from the source of electrical power to the headlamps including relay switching means, transistor means having an input and an output circuit, said output circuit being connected to the relay switching means and controlling the energization thereof and position of the relay switching means, capacitor means connected to the input circuit of the transistor means to control the bias and therefore the conductive periods thereof, and conductive means connecting the capacitor means to the lighting switch to charge the same when the lighting switch is in certain positions so that it can bias the transistor to cause it to conduct when the lighting switch is moved to another position.

3. In a control system for the various lamps on an automotive vehicle, a multi-position switch, a source of electrical power connected to said multi-position switch, said switch having a plurality of terminals connected to the various lamps to cause the same to be energized as the switch is moved to different positions, a shunt circuit connected directly from the source of electrical power to a portion of the lamps on the vehicle, relay switching means in the shunt circuit to control the same, and capacitor means connected to said relay switching means and to

the multi-position switching means and operative to cause the relay switching means to be actuated when the multi-position switching means is returned to off position to maintain said portion of the lamps energized for a short period of time until the capacitor means is discharged.

4. In a control system for the various lamps on an automotive vehicle including the headlamps and taillamps, a source of electrical power, a multi-position switch connected to said source of electrical power and having a plurality of terminals connected to said lamps including the headlamps and taillamps so that they will be energized as the switch is moved to its different positions, a shunt circuit interconnecting the source of electrical power and the headlamps including a relay switch, a relay coil for actuating said relay switch, transistor means having an input and an output circuit, said output circuit being connected to the relay coil and the source of electrical power to control the energization of said coil to close the relay switch and complete the shunt circuit, and capacitance means connected to the input circuit and to one of the terminals of the multi-position switch, the capacitance means being charged when the multi-position switch is in energizing position for the lamps and being operative to cause the transistor means to conduct when the multi-position switch is moved to its off position thereby energizing the coil to complete the shunt circuit.

5. In a control system for the various lamps on an automotive vehicle including the headlamps and taillamps, a source of electrical power, a multi-position switch connected to said source of electrical power and having a plurality of terminals connected to said lights including a headlamp terminal connected to the headlamps and a taillamp terminal connected to the taillamps so that they will be energized as the switch is moved to its different positions, a shunt circuit interconnecting the source of electrical power and the headlamps including a relay switch, a relay coil for actuating said relay switch, a transistor having a collector, emitter and base electrodes, said collector electrode being connected in series circuit with the coil and source of electrical power, a resistor connected between the taillamp terminal of the multi-position switch and the emitter electrode, a capacitor connected between the base electrode and the lower potential side of the source of electrical power, a diode connected across the emitter and base electrodes, and a variable resistance interconnecting the capacitor and the taillamp terminal so that when the multi-position switch is in its outer or on position the headlamps and taillamps will be energized through said multi-position switch, the transistor will be non-conducting, the relay switch open and the capacitor charged to the approximate potential of the source of electrical power, but when the multi-position switch is moved to off position the capacitor biases the transistor to conduct, energizing the coil to close the relay switch completing a shunt circuit to keep the headlamps energized until the capacitor has discharged, the discharge period being adjusted by the setting of the variable resistance.

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