This invention relates to automatic switching means and more particularly to automatic timed switching control means adapted to be connected to light controlled multi-filament lamp circuits to introduce a distinguishing or characteristic signal during automatic operation. Many highway vehicles having the conventional high and low beam filament headlamps are currently also supplied with automatic light sensitive control means to switch from high beam to low beam illumination upon the approach of the lights of a vehicle from the opposite direction and return to high beam when the vehicle has passed. This action is ordinarily accomplished manually by the driver. It is advantageous, however, to advise the approaching driver when a vehicle is equipped with automatic light controlled means for switching between high and low beam positions.

It is therefore an object in making this invention to provide means for advising the approaching driver whether the headlamp beams are under manual or automatic control.

It is a further object in making this invention to provide means for introducing a characteristic or distinguishing beam energization to advise the approaching driver that the car is equipped with automatic dimming apparatus.

It is a still further object in making this invention to provide an automatic control system whereby only one bright headlight filament is initially deenergized, followed by a later deenergization of the second bright filament of the other headlight to create a winking or blinking characteristic identifying signal.

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

Figure 1 is a circuit diagram of a control system embodying my invention.

Figure 2 is a circuit diagram of a modified form of control system embodying my invention; and

Figure 3 is a circuit diagram of a further modified headlamp control system.

In order to produce a characteristic signal to indicate to the approaching driver that the vehicle is equipped with automatic headlight dimming means, it is proposed to have one headlight switch from high to low beam upon actuation of the light sensitive control means, but to delay the switching of the other from high beam to low beam to produce an identifying wink or blink.

Referring more particularly to Figure 1, there is shown bright filament 2 and dim filament 6 of the left headlamp and bright filament 8 and dim filament 4 of the right headlamp. One terminal of each of these filaments is grounded. A relay switch 10 has two stationary contacts 12 and 14 connected to the filaments 2 and 4 respectively, and also it has an armature 16 which moves between the two contacts. Armature 16 is spring biased downwardly as shown in Figure 1, and is raised by energization of coil 18 of the relay 10. A second relay switching means 20 is connected in like manner to the right headlight. The relay 20 incorporates a fixed contact 24 connected to the bright filament 8, a second spaced stationary contact 22 connected to the dim filament 6, and an oscillating armature 26 which moves between the two. The armature 26 is spring biased upwardly as shown in Figure 1, and is pulled down into engagement with stationary contact 24 by energization of the relay coil 28.

As previously stated, the vehicle is also provided with a light sensitive control circuit which is shown diagrammatically by the block diagram 30, which control system provides a bias on the grid 32 of a power amplifying tube 34, the plate 36 of which is connected through a control relay coil 38 to a source of power. When a sufficient current flows through the relay coil 38 creates a sufficient field to attract armature 40 which oscillates between two stationary contacts 42 and 44. A conventional source of power such as indicated by the battery 46 has one terminal grounded and the other terminal connected through line 48 to armature 26 of relay 20, and also through the line 54 to stationary contact 44 of the master light actuated switch. Thus the two operating coils 18 and 28 are in series connection with the power source 46. Movable armature 40 is grounded through line 56. In order to provide the required delay in the operation of one of the relays, a series circuit including a resistance 58 and a condenser 60 is connected directly across the winding 28.

In the operation of this system it is desired to point out that the light sensitive control herein defined is so designed that with no light falling on the photocell a sufficient current flows through the last power amplifier stage to energize the coil 38 and cause it to attract its armature 40. Therefore, assuming operation in remote areas with little light falling on the automatic control, the relay armature 40 will be in contact with stationary con-
tact 44. This completes an energizing circuit for the two coils 18 and 28 as follows: ground, through battery 46, relay coil 28, line 52, relay coil 18, line 54, contact 44, armature 40, line 56, to ground. Both relays 10 and 20 are therefore energized. This causes armature 26 to be pulled downwardly so that it contacts stationary contact 24. At the same time relay armature 16 is drawn upwardly to engage stationary contact 12. This completes two obvious circuits from the power source 46 to the bright filament 2 and 8.

Upon the approach of sufficient light from the opposite direction to actuate the control system, relay coil 38 is deenergized and drops its armature 40. This breaks the circuit just traced for energizing relay coils 18 and 28, and relay coil 18 immediately releases its armature 16 and the spring bias pulls the same to its lower position. Thus the left headlamp switches at once from bright to dim. However, because of the time delay system including condenser 60 and resistor 58, that condenser which has been charged will discharge through resistor 58 and relay coil 28, causing relay 20 to retain its armature 26 for a short time period, and then release it after the condenser has discharged. At the instant of release of the left-hand control relay, the right relay still holds its armature and the right headlight remains on bright for a time period dependent upon the values of the condenser 60, the resistor 58 and the coil 28. At a slightly later instant this relay then switches.
to low beam and thus this system provides a characteristic sequential procedure from high to low beam in the said circuit headlamps. When the battery door has passed and the relay coil 38 is energized again, both coils 18 and 28 will be energized at the same instant and no delay will be evident on return to high beam.

The system shown in Figure 2 differs primarily from that shown in Figure 1 in that a bimetal heat relay is substituted in place of the second control relay. As in the first instance, the left light is shown as having a bright filament 2 and a dim filament 4, and the right light as having a bright filament 8 and a dim filament 6. The relay coil 18, as in the first instance, has two stationary contacts 12 and 14 connected respectively to the bright and dim filaments. It is to be noted that in this instance the relative positions of the two filaments in the left light have been reversed. The relay coil 18 has one terminal connected to the movable armature 16 which, in this instance is spring biased upwardly. The other terminal of the coil 18 is connected through line 62 to stationary contact 64 of the light sensitive activated switch 66. The armature 68 of that switch is grounded. The light sensitive control system 90 is then connected to and controlling the operating coil 76 of the light sensitive relay 66. The armature 16 of the control relay 10 is connected through line 72 to one terminal of the power supply as the battery 46, which, as in the previous instance, has its opposite terminal grounded.

Line 72 is also connected through tie line 74, with a bimetal armature 76 which is movable between the two stationary contacts 78 and 80 connected respectively to the dim and bright filaments 6 and 8. The position of the bimetal armature 76 depends upon the amount of heat applied thereto. When it is cool it engages the stationary contact 78, but when heated and warped it engages stationary contact 80. A heating coil 82 is located adjacent the bimetal armature 76 and has one terminal grounded and the other connected through line 84 with stationary contact 12 of the control relay 10.

In the operation of this system the relay coil 70 is energized when no light or little light falls on the photosensitive means. It thus attracts armature 68 into contact with the stationary contact 64 and completes an energizing circuit for relay coil 18. This circuit may be traced as follows: from ground, through power source 46, line 72, relay coil 18, line 62, contact 64, armature 68, to ground. Coil 18, therefore, attracts armature 16, completing an obvious circuit through stationary contact 12 to energize the bright filament 2 of the left headlight. When the correct circuit is completed the heating coil 82 of the bimetal switch 76, and it is heated to maintain it in contact with stationary contact 80, which completes a similar energizing circuit for the bright filament 8 of the right headlight. When a vehicle approaches from the opposite direction and its lights cause switching of the bimetal, the light sensitive control 30 deenergizes coil 70 and armature 68 moves upwardly. This breaks the energizing circuit for relay coil 18 and armature 16 likewise moves away from contact 12 and engages contact 14. The left light switch 60 immediately from bright metal armature 76 does not move away from contact 80 until it cools, and the circuit to bright filament 8 in the right light will remain. As armature 76 cools it will move away from contact 80 and engage contact 78 to switch the right headlight from bright to dim but introduce a certain lag or time delay. While in this instance there will be some short delay in also switching back from low beam to high beam in the right light, it is the nature of thermal relays that they heat up much faster than they cool to operate their switch contacts, and therefore, while there is a theoretical delay in going back to bright, it is hardly noticeable.

The control system shown in Figure 3 is a slight modification of that shown in Figure 2 in that while a thermal snap switch is used to control the right light, it is so placed in circuit that the heating coil is incorporated in said circuit so that the source of heat is not dim on high beam but dim on low beam instead of, as in Figure 2, being incorporated in circuit when the lights are on high beam. The decision as to which form is most advantageous depends upon whether the operator utilizes his lights more on high beam or low beam operation. That form which permits longer deenergized periods for heating coil 82 should be selected. In Figure 3, therefore, there is provided the same light sensitive control system operating master relay 66 which in turn controls a control relay 16 to directly control the right headlight. If now a source of light approaches the vehicle, the control system 4 and 2 respectively. The source of power is connected to this portion of the circuit exactly as in Figure 2. However, the heating coil 82 is connected in this instance to stationary contact 14 of the relay 10 instead of 12. The bimetal snap element 76' or 76" is connected between stationary contact 78' and 80' to control the dim and bright filaments 6 and 8 respectively.

In the operation of this system, assuming that the vehicle is being operated in a darkened area and that relay coil 70 is thus energized, armature 68 will be drawn downwardly to engage contact 64 and relay coil 18 will be energized. Armature 16 therefore, engages contact 12 and bright filaments 2 are energized. At the same time thermal element 76' which is cool, engages stationary contact 80' and bright filaments 8 of the right headlamp are energized. If now a source of light approaches the vehicle, the bimetal or thermal snap switch remains in its lowered position and the right headlight stays on bright or high beam illumination. Completion of the circuit between armature 16 and stationary contact 14 completes a heating circuit to heating element 82' and in a short time the thermal snap element 76' will move from contact 80' to contact 78' and switch from bright to dim in the right headlight. As above mentioned, this will not be as long a period of time as that required to cool one of these thermal relays, but may be adapted to provide a sufficiently long time to give a characteristic signal. When the vehicle is again in a darkened area, and relay coil 70 is energized by light sensitive control 30, armature 68 engages fixed contact 64, and causes coil 18 to be energized, switching the left headlight immediately from dim filament 4 to bright filament 2. Because of the thermal delay, the right filament 2 of the left headlight and bright filament 8 of the right headlight also goes on bright at the same instant the left light goes on bright. The dim filament 6 of the right light remains on until the thermal bimetal 76' cools.

In the foregoing description, it is understood that the right light could, in any of the described systems, be dimmed previous to dimming the left light, and that the description involving the dimming of the left light first in all cases is merely for simplicity.

I claim:

1. In a control system for multiple filament lamps, a source of electrical power, switching means connected to said source and to the filaments of at least two lamps to alternately energize one of the filaments in each lamp, and delay means connected to said switching means to delay the switching of one filament for a predetermined time after the other has switched.

2. In a control system for a plurality of lamps having a bright and dim filament in each, a source of electrical power, a first switching means connected to the source of power and to the bright and dim filaments of one lamp to alternately energize the same, a second switching means connected to said source and to the bright and dim filaments of a second lamp, and sequential operating means
for both switching means connected to said source to operate the second switching means at a predetermined time after the first.

3. In a control system for a plurality of lamps having a bright and dim filament in each, a source of electrical power, a first switching means connected to the source of power and to the bright and dim filaments of one lamp to alternately energize the same, a second switching means connected to said source and to the bright and dim filaments of a second lamp, operating means for the first switching means connected to the source of power, a second operating means for the second switching means connected to said source of power, a master control switch in circuit with the source of power and both the first and second operating means, and capacity means connected to said second operating means to delay movement of the second switching means.

4. In a control system for a plurality of lamps having a bright and dim filament in each, a source of electrical power, a first switching means connected to the source of power and to the bright and dim filaments of one lamp to alternately energize the same, a second switching means connected to said source and to the bright and dim filaments of a second lamp, operating means for the first switching means connected to the source of power, a second operating means for the second switching means connected to said source of power, a master control switch in circuit with the source of power and both the first and second operating means, and means for delaying the operation of the second switching means for a predetermined time after the operation of the first.

5. In a control system for a plurality of lamps having a bright and dim filament in each, a source of electrical power, a first switching means connected to the source of power and to the bright and dim filaments of one lamp to alternately energize the same, a second switching means connected to said source and to the bright and dim filaments of a second lamp, magnetic operating means for said first switching means, heat sensitive operating means for said second switching means including a heating coil and a master switch connected to both the heating coil and magnetic operating means and source of power to control the operation of both switching means.

No references cited.