My invention relates to direction signal systems of the type used on motor vehicles to give a signal indicating that the driver intends to turn right or left.

An object of my invention is to provide a signal system in which the rear signal light flashes on and off on the side to which the driver intends to turn, and in which the headlight on the same side flashes by alternating between the upper and lower beam filaments.

For further objects of the invention and for a complete understanding thereof reference should be had to the specification and claims to the appended drawing.

The single figure of the drawing is a circuit diagram of a signaling system embodying my invention with the various signal lights and head-lights shown schematically in their relation to each other.

In the drawing 10 indicates any source of electrical energy such as a storage battery which may be readily adapted to installation and use in a motor vehicle. The left headlight 12 carries an upper beam filament 14 and a lower beam filament 16; the right headlight 18 carries upper and lower beam filaments 20 and 22, respectively. The upper beam filaments are normally mounted at the focal point of the reflector, and may be called “in-focus” filaments. The lower beam filaments are necessarily then “out-of-focus” filaments. At the rear of the vehicle are mounted left and right rear signal lights 24 and 26, respectively. A lighting switch 28 is provided to complete a circuit between the battery and the lights. A foot switch 30 of conventional design is provided to enable the driver of the vehicle to switch from the upper beam to the lower beam and back again at will. Foot switch 32 carries a movable contact 34 which engages with either of two fixed contacts 34 and 36. A spring 38 biases the movable contact into engagement with fixed contact 34 so that the upper beam filaments are normally in the circuit with the light switch closed. It is understood, of course, that the foot switch itself is only an incidental part of the signaling system of my invention and any conventional switch means for switching from the upper beam filament to the lower may be used. A direction signal switch 40 is provided to enable the driver to make connections to the proper lights to give the signal desired. Switch 40 may be of any suitable design but I show it schematically as comprising a shaft or bar 42 of insulating material carrying movable contacts 44, 46, 48, 52, 53, 55, and 54. Each of these movable contacts is arranged to cooperate with any one of three pairs of fixed contacts as shown. These fixed contacts and the conductors connected to them will be discussed in connection with the rest of the circuit in subsequent paragraphs outlining the operation of my invention.

A flasher or interrupter is indicated generally by 56. The details of this flasher form no part of my invention and any suitable conventional flasher may be used. However, I prefer to use one such as shown in the drawing in which an iron core 58 carries a coil 60 which makes an armature electromagnet having a pole face 62. Mounted on the core 68 in electrical conducting relation therewith is a movable contact 54 arranged to engage either of fixed contacts 66 or 68. A thermal element comprising a fine wire 70 is tightly stretched between its contact point with movable contact 64 and insulating bushing 72 in arm 50a of core 58. A resistance 74 is electrically connected with thermal element 70 at bushing 72. Resistance 74 is electrically connected to fixed contact 68 by a conductor 76.

A brief description of the operation of interrupter 56 is advantageous at this point: thermal element 70 is in tension as stated and normally keeps movable contact 64 in electrical conducting engagement with fixed contact 68 and out of engagement with fixed contact 66. Movable contact 64 is preferably formed of a leaf spring having suitable conducting properties and being biased toward conducting relation with fixed contact 66 in opposition to the bias of the tensioned thermal element 70. For the purposes of this discussion the operation of interrupter 56, let it be assumed that the necessary switches are closed to complete conducting paths through the interrupter. With movable contact 64 in engagement with fixed contact 66 as shown in the diagram, current flows from battery 10 through conductor 78 to iron core 58 which also serves as a conductor. Movable contact 64 is in conducting relation with core 58. There is therefore current flow through movable contact 64 to fixed contact 66. Current also flows through thermal element 70, resistance 74, wire 76, and electromagnet 58. This current flow serves to heat up thermal element 70 causing it to release or relieve its tension, whereupon the normal bias in the spring leaf of movable contact 64 moves this contact out of engagement with fixed contact 66 and into engagement with fixed contact 68. This shift of movable contact 64 is assisted to some extent by the electromagnet 58, which tends to give the motion a snap action to reduce sparking between the contacts. Current flow now is furnishing movable contact 64 to fixed contact 68. This flow short circuits the thermal element 70 and resistance 74, giving thermal element 70 a chance to cool. When it has cooled off its tension is restored and it pulls movable contact 64 back into conducting engagement with fixed contact 66 from which point the cycle is repeated. It
will be seen that the various tensions, resistances and the magnet strength can be so apportioned as to give an interrupter frequency of any desired value.

The operation of the signaling device as a whole will now be described. Let it be assumed fixed contact 43 is open—i.e., operation of the system under daylight conditions. If the driver wishes to indicate that a left turn is to be made he pushes the direction signal switch toward the left. The circuit thereupon established is as follows: battery 10, conductor 78, core 59, movable contact 64, contact 66, conductor 80, fixed contact 82 at the extreme left of direction signal switch 40, bridging contact 54, fixed contact 84, conductor 86, upper beam filament 16 of left headlight 12, and back to the battery through the ground. There is also current flow through thermal element 70, resistance 74, conductor 76, electromagnet 60, conductor 88, fixed contact 93, bridging contact 46, fixed contact 97, and back to the battery through the ground. As previously explained, this last described circuit heats up thermal element 70 whereupon movable contact 64 is biased out of engagement with fixed contact 66 and into engagement with fixed contact 68. A circuit is then established as follows: battery 10, conductor 78, core 59, movable contact 64, fixed contact 95, conductor 94, fixed contact 96, bridging contact 52, fixed contact 98, conductor 100, lower beam filament 16 of left headlight 12, and back to the battery through the ground. Note that conductor 102 is connected to conductor 100. This connection establishes the following circuit: conductor 102, fixed contact 104, bridging contact 44, fixed contact 106, conductor 105, left rear signal light 24, and back to the battery through the ground. After thermal element 70 is cooled sufficiently the cycle is repeated. It is evident therefore that the left headlight will flash, but this flashing comprises alternate energizing of the two filaments rather than alternate energizing on and off of a single filament. It is also evident that the left rear signal light will flash, but this flashing is only intermittent. The right headlight and the right rear signal lights are unaffected. It may be pointed out here that even with movable contact 64 in engagement with fixed contact 66 there is necessarily a small current flow through thermal element 70, resistance 74, conductors 78 and 94, fixed contact 95, bridging contact 52, fixed contact 98, conductor 100, and lower beam filament 16 of headlight 12. Due to this high resistance path, however, the value of this current is not enough to heat filament 16 to incandescence so that only filament 14 burns. Similarly, the parallel flow through conductor 102 to the left rear signal light under these circumstances is not enough to heat the filament of this light to incandescence. If a right turn is intended under daylight conditions, direction signal switch 40 is moved to the right and the circuit established is the following: battery 10, conductor 78, core 59, movable contact 64, fixed contact 65, conductors 80 and 110, fixed contact 112, bridging contact 50, fixed contact 114, conductor 116, upper beam filament 20 of right headlight 18, and back to the battery through the ground. As before, upon heating of thermal element 70, engagement between movable contact 64 and fixed contact 65 is broken and engagement of movable contact 64 and fixed contact 63 is made, establishing the following circuit from movable contact 64, fixed contact 68, conductors 94 and 116, fixed contact 120, bridging contact 48, fixed contact 122, conductor 124, lower beam filament 22 of right headlight 18, and back to the battery through the ground. It should be noted that conductor 125 is connected to conductor 126, fixed contact 123, bridging contact 44, fixed contact 130, conductor 132, and right rear signal light 26. When direction signal switch 40 is in its extreme right-hand position, movable contact 64 bridges fixed contacts 80a and 82a thus completing a circuit for electromagnet 60 with the direction signal switch in this position. It is seen then that for a right turn indication the right headlight flashes by alternately energizing the two filaments, and the right rear signal light flashes on and off. The left headlight and left rear signal light remain unaffected.

There may be situations in which the driver of the vehicle will want to drive with the parking lights on. Switch 28 in this case will connect battery 10, completing a circuit to the parking lights and also contact 31. With direction signal switch 40 in its neutral or mid position the circuit is thereby completed to the rear signal lights as follows: battery 10, conductor 11, switch 28, fixed contact 31, conductor 134, fixed contact 136, bridging contact 45, fixed contact 138, conductor 108, left rear signal light 24, and back through the ground. Conductor 134 also goes to fixed contact 140 to complete the following circuit: fixed contact 140, bridging contact 44, fixed contact 122, conductor 132, right rear signal light 26, and back through the ground. If with switch 28 in this position a left turn is indicated, bridging contact 44 is moved out of engagement with fixed contacts 140-142, thus breaking the circuit to the right rear signal light 24. Simultaneously, bridging contact 44 is moved out of engagement with fixed contacts 140-142 and into engagement with fixed contacts 125-130. Right rear signal light is then in the flasher circuit as described above. The circuit for the right headlight is also as described above.

For right driving, switch 23 will be in engagement with contact 29. Switch 28 will also be in engagement with contact 31 completing circuits to the left and right rear signal lights as described above. With switch 28 in this position the circuit to the headlamps is as follows: battery 10, conductor 11, switch 28, contact 29, conductor 144, movable contact 32 of foot switch 30, fixed contact 34, conductor 145, fixed contact 148, bridging contact 54, fixed contact 158, conductor 65, upper beam filament 14 of left headlight 12, and back to the battery through the ground; from conductor 146 to conductor 152, fixed contact 154, bridging contact 50, fixed contact 159, conductor 116, upper beam filament 20 of right headlight 18, and back to the battery through the ground. If foot switch 23 is depressed, a movement of engagement with fixed contact 34 and into engagement with fixed contact 35 the circuit from
movable contact 32 is the following: fixed contact 36, conductor 159, fixed contact 160, bridging contact 52, fixed contact 162, conductor 100, lower beam filament 16 of left headlight 12, and through the beam control switch. From conductor 159 a circuit is also completed as follows: conductor 164, fixed contact 165, bridging contact 48, fixed contact 165, conductor 124, lower beam filament 22 of right headlight 18, and back through the ground. If the direction signal indicator is actuated to indicate a left turn with the lights on and with foot switch 30 in the position shown so as to put the upper beam filaments in the circuit, bridging contact 50 is moved out of engagement with contacts 154—156 and into engagement with contacts 154a—156a, maintaining the circuit to upper beam filament 28 of right headlight 18 because contacts 154a and 156a are electrically connected to contacts 154 and 156, respectively. However, contact 54 moves out of engagement with fixed contacts 146—160 and into engagement with contacts 82—84. Similarly, bridging contact 52 moves out of engagement with fixed contacts 160—162, and into engagement with contacts 160a—162a. The shift in bridging contacts 52 and 54 takes the two filaments of left headlight 12 out of connection with the aforesaid circuit through foot switch 30 and puts them into the above described circuits with interrupter 56. It should be noted elsewhere that because of the shift to the leftward movement of contact 52 the right Ward movement of contact 52 takes this contact out of engagement with fixed contacts 160—162 and into engagement with contacts 160a—162a. Since contacts 160a and 162a are directly connected to contacts 160 and 162, respectively, there is no change in the condition of the left headlight.

By way of summary, the operation in general terms is as follows: If the direction signal switch is actuated with the lights off the headlight goes on the side toward which the turn is contemplated. Instead of burning steadily, however, it flashes. This flashing is accomplished by alternately energizing the upper and lower beam filaments. The rear signal light on the side toward which a turn is to be made merely flashes on and off. If the direction signal switch is actuated with the parking lights on the parking lights are not affected and the tail and headlights are energized the same as with the light switch in its off position. The signal light on the side toward which the turn is to be made flashes on and off as before and the other rear signal light goes off and stays off. If the direction signal switch is actuated with the headlights on the headlight on the side toward which the turn is to be made is caused to flash by alternate energizing of the filaments. The headlight on the other side remains unaffected whether its upper or its lower beam filament was energized at the time the direction indicator switch was actuated. With either parking or headlight on, the rear signal light on the side toward which the turn is to be made flashes on and off and the other rear signal light goes off and stays off.

It will be evident to those skilled in the art that changes and modifications in my invention may be made but I aim to cover the true scope of my invention in the appended claim.

I claim:

1. In a lighting system for vehicles, right and left headlight each having an upper beam filament and a lower beam filament, a battery, a first circuit for energizing said headlight filaments including said battery, a main switch for turning said circuit on and off, and a beam control switch for selectively connecting said circuit to either said upper or lower beam filaments, a second circuit for energizing said headlight filaments including said battery and a periodic interrupter switch for alternately connecting said second circuit to the upper and lower beam filaments of said headlight, and a selector switch interposed in said circuits between said beam control and periodic interrupter switches and said headlight filaments with circuit connections to said filaments controlled by movement of said selector switch, said selector switch having one position in which the upper and lower beam filaments of both headlights are connected in said first circuit and movable to selective positions in which the upper and lower beam filaments of either the right or left headlight are disconnected from said first circuit and connected in said second circuit to alternately energize said upper and lower beam filaments of said one headlight as a direction signal with the filaments of the other headlight connected in said first circuit and controlled by said main switch and beam control switch.

LUCIAN B. SMITH.