My invention relates to improvements in self resetting or self cancelling switches and particularly to the light controlling switch for vehicles disclosed in my patent application Ser. No. 694,283, filed November 4, 1957, now U.S. Patent No. 2,924,680.

It is an object of my improvements to install in the switch a simple variable timing device enabling the driver to selectively vary the duration of display of the turn signals to suit conditions at the moment, when he wishes to make a turn, for example the distance to be traversed in completing the turn, the speed of the vehicle, waiting periods at street intersections etc.

In the switch mentioned above and in other switches, of the kind, when the operating handle is displaced into the left or right turn signal flashing position, a current is passed through a resistor to heat and thereby bend a piece of bimetal after a certain time delay causing automatic cancelling of the signals and resetting of the switch.

In my improved switch the handle may be displaced into one of several latched positions on either side of the normal off position, and a part of the resistor connected in the circuit to vary the time delay with the deflection of the handle. If the selected time delay should proved to be too long and the signals remain flashing after the turn is completed, they may be cancelled and the switch reset manually by push button action.

When it is necessary so make many turns at frequent intervals, for example when driving in a city and in hot weather, residual heat may accumulate in the thermostat and surroundings and cause a too quick response of the bimetal, so that the signals are put out before the turn is completed. A driver using my switch will be able to cope with this situation by choosing a more deflected position of the handle.

A further object is so facilitate manufacture, assembly and connection of the switch by making it everywhere symmetrical with some of the main parts identical.

Other objects and advantages of my improvements will appear as the specification proceeds and with use of the switch.

I attain these objects by the mechanism illustrated in the accompanying drawing, in which FIG. 1 is a plan view of the switch with the covers removed; FIG. 2, a sectional view on the plane 2—2 in FIG. 1; FIG. 3 is a plan view of the switch with the covers and a terminal board removed; FIG. 4 is an inside view of a cover, and FIG. 5, an electrical circuit diagram.

Sier reference numerals refer so similar parts throughout the several views.

Referring to the drawing, the mechanism is enclosed in a center housing 1, to which identical covers 2 are fastened in assembled relation by means of a screw 3 and nut 4, the screw passing through inwardly extending bosses 5, which are integral with the covers and provided with bearings 6 for a pivot stud 7, the latter having a hole 8 for passage of the assembly screw 3. The pivot stud 7 is secured to an insert 9, which is in turn molded into a Bakelite contact block 10; a tubular handle 11 is screwed into a plate 12, which may be fastened by screws to the contact block 10. The handle is divided into two parts and screwed together to afford ready access to parts inside the handle. A pilot lamp 13, the bulb projecting outside the handle end, is removably held in a bayonet socket 14, the latter fitting slidingly within the handle in contact making relation with the handle wall; the socket is pressfitted on a magnetic plunger 15, which enters with a reduced diameter a solenoid 16 provided with a metal jacket, that fits closely within the handle and to which one end of the solenoid coil is soldered, while the other end 17 is further insolated to be connected at later described by means of suitable brackets (not shown) the switch may be mounted in the traditional manner on parts of the vehicle, which are "grounded" or connected to the negative side 18 of a vehicle battery 19.

The center contact point of the pilot lamp 13 contacts the resilient head 20 of a slender brass pin 21, and the pin, insulated within a sleeve 22 in the plunger 15, passes centrally through the latter and into a cavity 23 in the contact block 10 to be connected to the positive side 24 of the battery 19 as will be described. A coil spring 25 acting between solenoid and plunger biases a latch pin 26, passed transversely through the plug 27 projecting outside the handle through slots 28 in the handle wall, to follow a cam 28, when the handle is displaced. The cam extends inwardly from the housing wall, which is here circular and concentric with the pivot stud 7 and on both sides of an elongated hole 29, the ends of the hole serving as extreme stops for the handle. At angular distances 15°, 30° and 45° on either side of center the cam 28 is provided with notches 30 for the follower pin 26 to enter and latch the handle in these positions. Pressure on the pilot lamp releases the pin 26, and action by a coil spring 31, which is suspended between the insert 9 in the contact block and ears 32 in the housing wall will cause contact block and handle to return to the center position. If the solenoid is energized the plunger will be drawn further into it, and the switch will then take the normal position automatically. The contact block 10 carries resilient brass contacts, for which there are formed rectangular recesses 33 to contain contacts 34 and transverse rectangular holes 35 for contacts 36 and 37; each contact has two extensions 38 designed to make electrical connection with contact surfaces 39 in two identical Baked terminal boards 40, one of which is placed on either side of the contact block. The boxes 5 in the covers 2 enter shallow holes 41 in the terminal boards to hold them by means of the assembly screw 3 and nut 4 against the ears 32 and reinforced sides 42 of the housing wall, in which position there is a suitable pressure between contacts 34 and 35 and the opposite faces of the contacts are disposed in the terminal boards on the circular arcs described by the contact points 38, and connections are made, when the handle is in a latched position. A contact 34 will bridge two contact surfaces in the same terminal board to connect a vehicle light either to an external flasher 43 or to an external switch 44 in accordance with the circuit diagram FIG. 5 and with markings on the switch shown in FIG. 1, while a contact 35, 37 will connect a contact surface in one terminal board with a contact surface in the other terminal board to function in the solenoid and pilot lamp circuit to be described. Rivets 45 are passed through the terminal boards, their heads or connecting lugs such as 46 serving as the contact surfaces 39, while other lugs, such as 47, are used on the outside of the terminal boards to connect some of the rivets and reduce wiring and soldering. Connecting wires are soldered directly to the rivets, passed through openings 48 in the terminal boards and collected into a cable.

Two identical thermostats 49 are constructed by winding an insulated resistance wire 50 on a strip of bimetal 51; contact clips 52, 53 are provided on the ends of the bimetal and one end 54 of the coil 50 is electrically connected to the bimetal, while the other coil end 55 is insulated from it and grounded to the cover; a thermostat is held securely in a pocket 56 formed inside each cover.
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near the rim with the ends of the bimetal extending outside the socket. A leaf spring 57 with a contact point 58 on each extreme end is fastened between the spring plate 33 and the contact block 16 to trace under suitable tension when the handle is displaced on either side; the inner surface of a coil 59, where the insulation has been removed, so as to connect the coil to the ground at the point of contact 33.

On either terminal board a leaf spring contact member 56 is connected to a lug 60 and bent outward to make contact with the bimetal at the clip 52, likewise a contact member 61 is connected to a lug 62 on either terminal board and bent outward without touching the bimetal, but designed to make contact at the clip 53 with the bimetal, so the latter tends when reaching a certain temperature

The insulated wire 17 from the solenoid is led into the opening 23 in the contact block 16 and soldered to the inner transverse contact 36, while the brass pin 31 is in contact with the slot hole 13 is slingly connected to the coil base and the coil contact 27 as shown in FIG. 4. Turning now to the circuit diagram in FIG. 5, wherein the symbols are the given same reference numbers as the parts they represent, the position of the contacts 24, 26, 27 also indicates the position of the handle 11, which is represented in the diagram to be in the center or neutral position. When the handle is displaced into any latched position either side of center a contact circuit will be completed as follows: lug marked B in one of the terminal boards, these lugs being wired to the positive side 24 of the battery 19, transverse contact 37, lug 40 in the opposite terminal board, contact member 59, coil end 54 in touch with the bimetal and a portion of the resistance wire 50 to the point of contact 58 with the grounded leaf spring 27. Heat will be generated at a time rate depending on the length of the resistance wire 50 in the circuit and the bimetal will bend after a corresponding time delay, thereby energizing the solenoid through the bimetal at 53, a contact member 61, a lug 62 and the transverse contact 36.

In the circuit diagram in FIG. 5 the vehicle lights are designated L or R according to their place on the left or right side of the vehicle; in the center or neutral position of the hand the lights are all controlled by the external switch 44, which are assumed to be already present in a vehicle.

When the handle is displaced into a latched position on either side of center, the lights on that side of the vehicle will flash, while the lights on the other side will remain under control of the switches 44.

To flash the signals for a relatively short time, for example in changing from one traffic lane to another, he will set the handle in a 15° off center position, for a longer period he will choose the 30° position, and with the handle in a 45° off center position for example when a complete turn is to be made, there will be a still longer delay before the signals are automatically deactivated.

The pilot light will be on, while the turn signals are flashing.

While I have described a specific embodiment of my invention, it is understood that changes and modifications may be made in the mechanism and wiring of the switch within the spirit of the invention and scope of the claims appended hereto.

I claim:

1. In a light controlling switch wherein an operating handle is displaced into contact making positions and automatically released and returned to a normal "off" position after a time delay, means to vary said delay in relation to the displacement of the handle, in combination with: an operating handle; handle latch and release means operative in a plurality of positions of the handle and including a latch and released means therefor, a spring acting in connection with said latch and recessed means to hold the handle in position and electromagnetic means to oppose said spring action and release the handle when energized; an electric resistor heater; a heat responsive element in close association therewith and adapted to connect said electromagnetic means in circuit when heated to response temperature and to open circuit when in normal condition; means operated by the handle and including a member in continuous sliding contact with said resistor to connect a part thereof in circuit depending on the displacement of the handle and accordingly vary the rate of heating of said element.

2. In a switch according to claim 1 manually operated auxiliary handle release means acting substantially in the line at effective relative movement of said latch and released means.

3. In a switch according to claim 1 a shape of said latch and recessed means cooperative to hold the handle unyieldingly to forces acting toward said off position.

4. A switch according to claim 1 wherein said electromagnetic means is a solenoid and plunger.

5. In a switch according to claim 1 means including said said resistor to vary the rate of heat generated in steps corresponding to the latched positions of the handle.

6. In a switch according to claim 5 manually operated auxiliary handle release means acting substantially in the line of effective relative movement of said latch and released means.

7. In a switch according to claim 5 a shape of said latch and recessed means cooperative to hold the handle unyieldingly to forces acting toward said "off" position.

8. A switch according to claim 5 wherein said electromagnetic means is a solenoid and plunger.

9. In a light controlling switch for vehicles wherein an operating handle is displaced into a plurality of contact making latched positions from a normal "off" position: an operating handle; an electromagnet; a bimetallic thermostat including a resistor; a member movable with the handle and slidingly contacting said resistor to connect a part thereof in a vehicle battery circuit and thereby vary the rate of heat application to the bimetal and the delay in bending thereof with the position of the handle; means for applying the response of the bimetal to actuate said electromagnet and release the handle from its latched positions, and resilient means biasing the handle toward said normal position.

10. In a light controlling switch for vehicles wherein an operating handle is displaced into a plurality of contact making latched positions from a normal "off" position: an operating handle; an electromagnet; a bimetallic thermostat including a tapped resistor; means for connecting said resistor in a vehicle battery circuit to vary the rate of heat application to the bimetal and the delay in bending thereof with the position of the handle; means for applying the response of the bimetal to actuate said electromagnet and release the handle from its latched positions, and resilient means biasing the handle toward said normal position.

11. In a light controlling switch for vehicles wherein connections are made when an operating handle pivoted in the switch casing and extending outside thereof is displaced into latched positions from a normal position: a hollow operating handle; a spring biased sliding member therein; a latch projecting from said sliding member; means with recesses to receive the latch; a magnetic plunger; a coating solenoid; a bimetallic thermostat including a variable resistance, said resistance and solenoid connected in a vehicle battery circuit to cause, when energized, action of the solenoid on said handle with a time delay varying with the position of the handle; means for applying said magnetic action to release the handle from its latched positions, and resilient means biasing the handle toward said normal position.

12. In a light controlling switch for vehicles wherein connections are made when an operating handle pivoted in the switch casing and extending outside thereof is dis-
placed into latched positions from a normal position: an operating handle; a magnetic plunger; a coacting solenoid; a bimetallic thermostat including a variable resistance; said resistance and solenoid connected in a vehicle battery circuit to cause when energized action at the solenoid on said plunger after a time delay varying with the position of the handle; means for applying said magnetic action to release the handle from its latched positions, and resilient means biasing the handle toward said normal position.

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