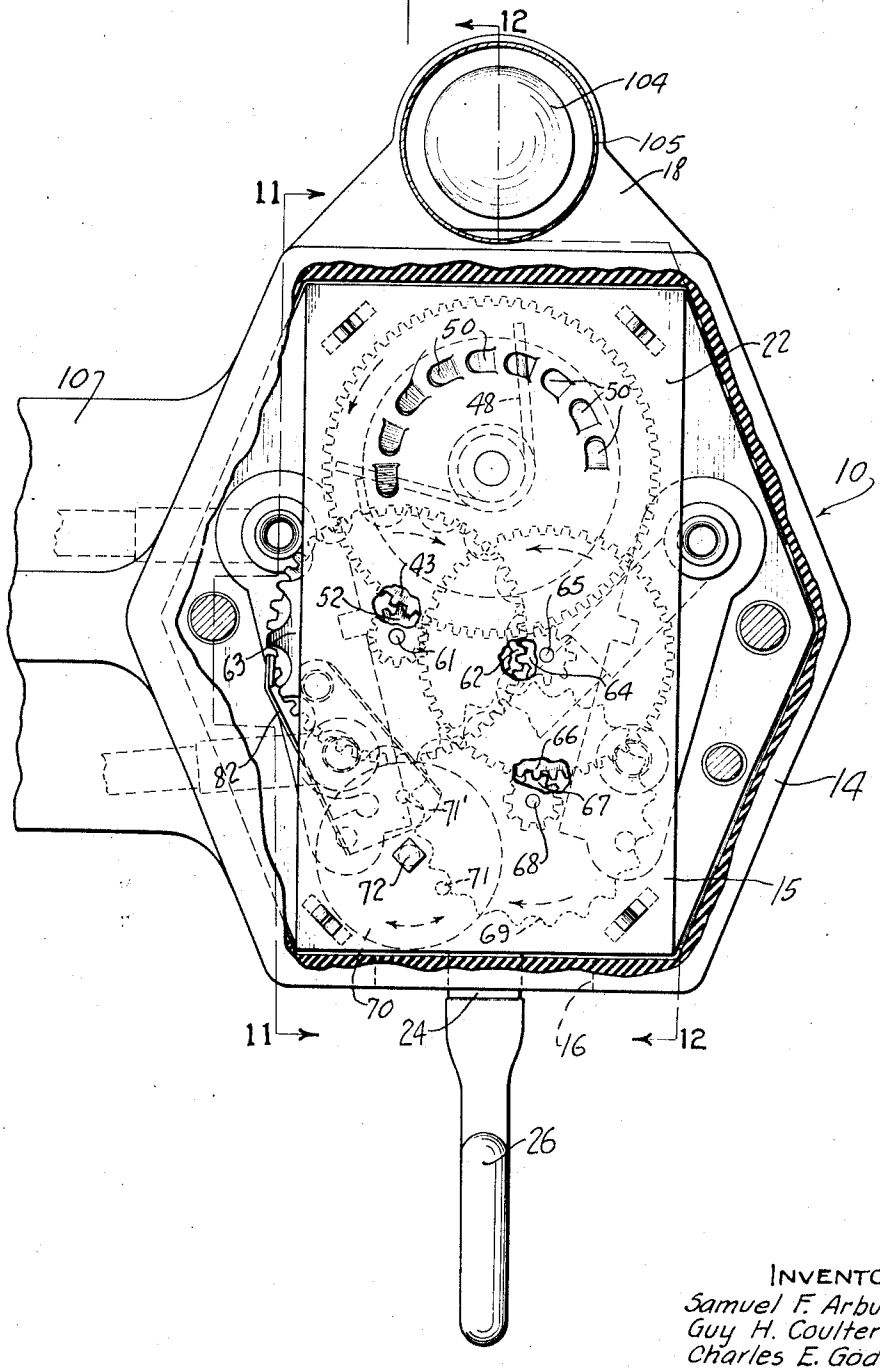
Feb. 11, 1941. S. F. ARBUCKLE ET AL 2,230,994

RETARDED SWITCH

Filed Feb. 15, 1937 4 Sheets-Sheet 1

Fig. 1.



INVENTORS
Samuel F. Arbuckle
Guy H. Coulter
Charles E. Godley

BY
Baselton, Whitcomb & Davies.
ATTORNEYS

Feb. 11, 1941. S. F. ARBUCKLE ET AL 2,230,994

RETARDED SWITCH

Filed Feb. 15, 1937 4 Sheets-Sheet 2

Fig. 1A.

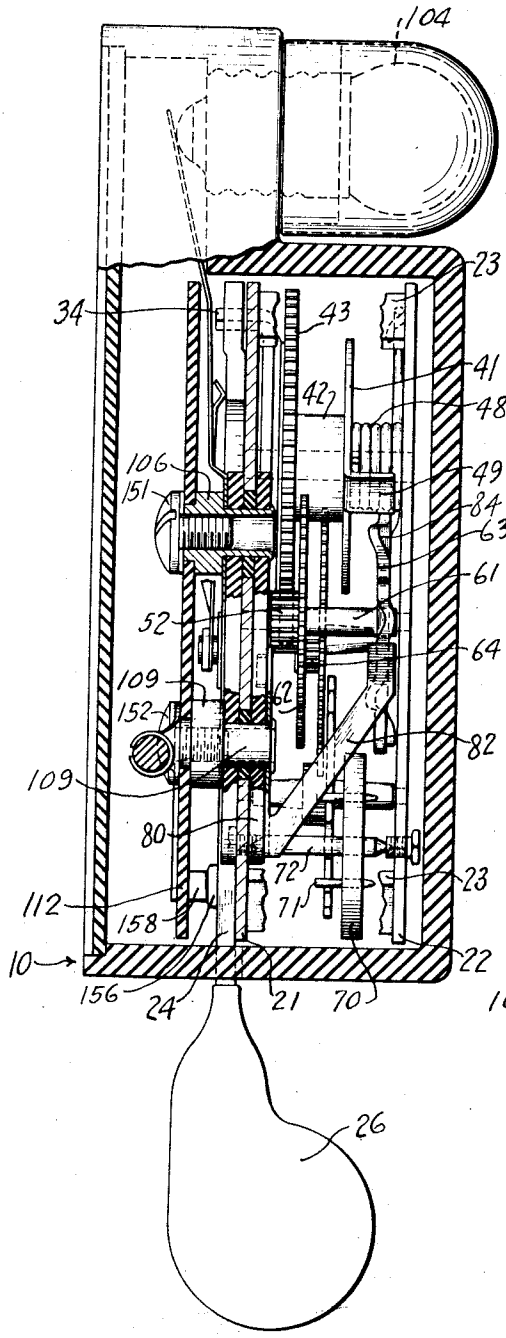
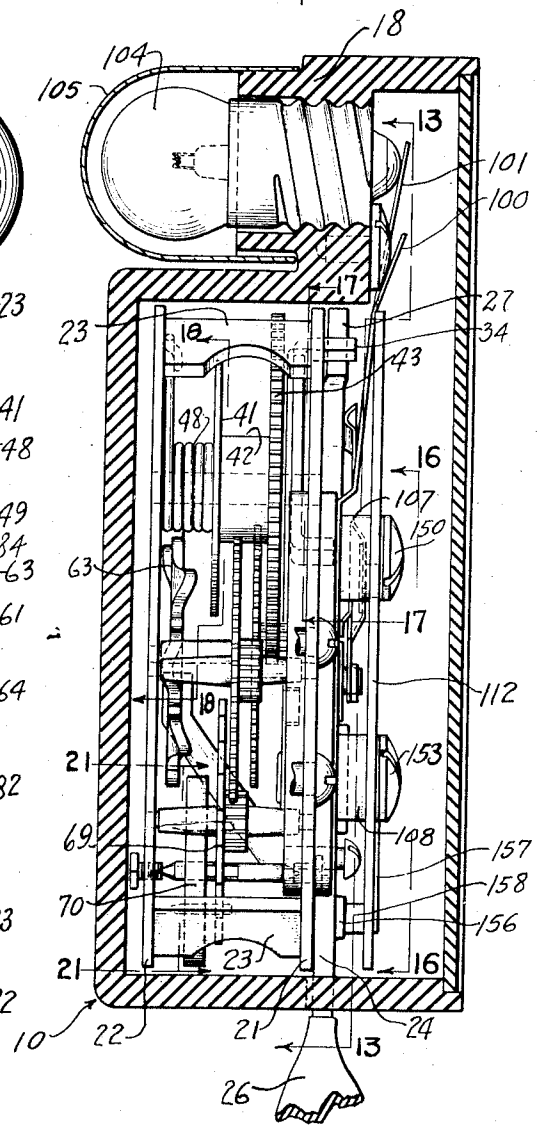


Fig. 2.



INVENTORS
Samuel F. Arbuckle
Guy H. Coulter
Charles E. Godley

BY Brasellon, Whitcomb & Davies.
ATTORNEYS

Feb. 11, 1941. S. F. ARBUCKLE ET AL 2,230,994

RETARDED SWITCH

Filed Feb. 15, 1937 4 Sheets-Sheet 3

Fig. 3.

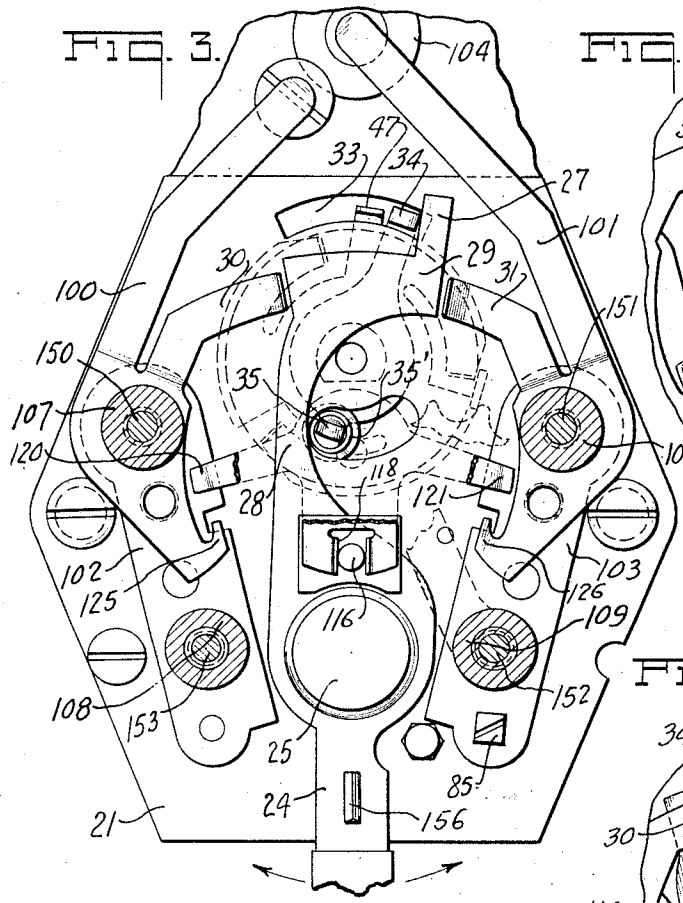


Fig. 4.

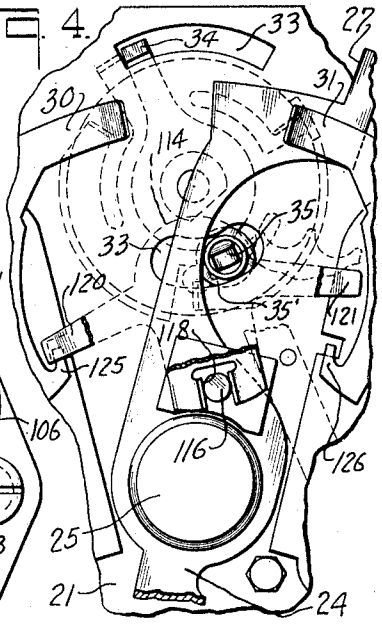


Fig. 5.

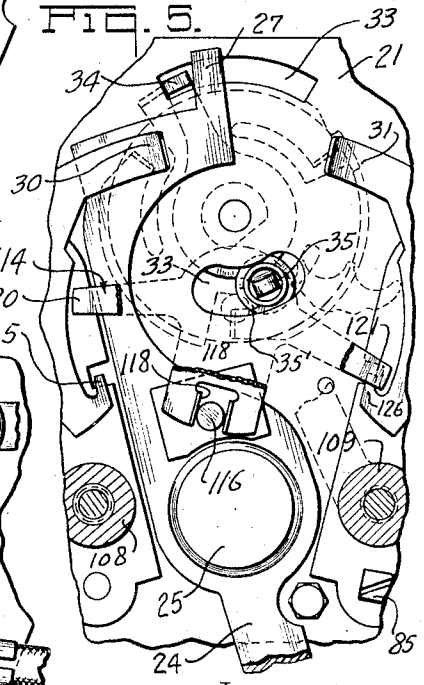
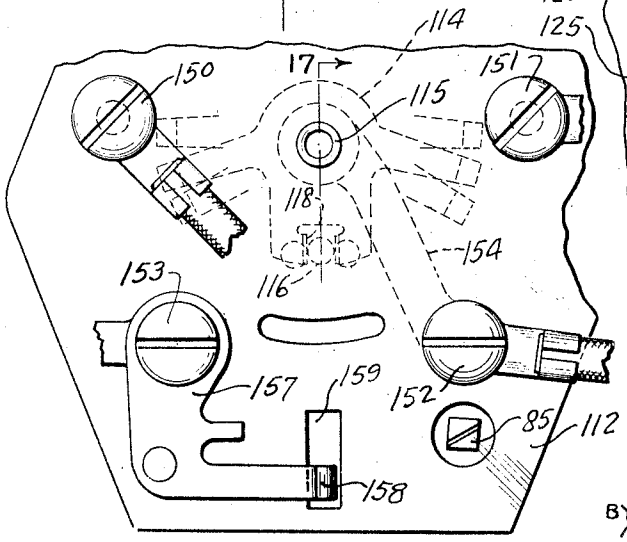


Fig. 6.



INVENTORS
Samuel F. Arbuckle
Guy H. Coulter
Charles E. Godley

BY Brasellon, Whitcomb & Davies.
ATTORNEYS

Feb. 11, 1941. S. F. ARBUCKLE ET AL 2,230,994

RETARDED SWITCH

Filed Feb. 15, 1937 4 Sheets-Sheet 4

Fig. 7.

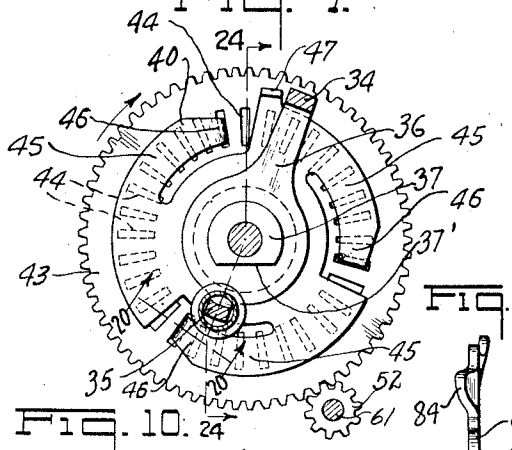


Fig. 8.

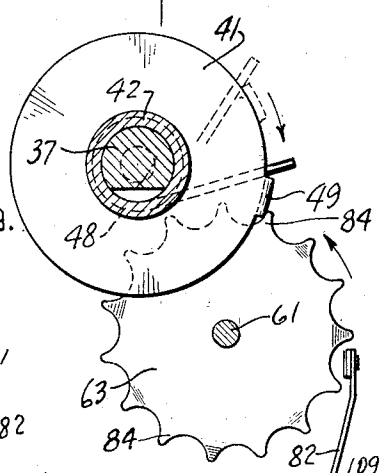


Fig. 9.

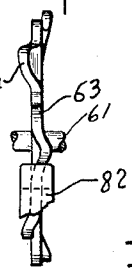


Fig. 10.

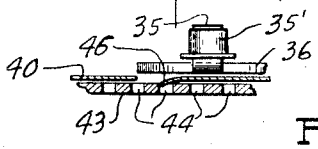


Fig. 11.

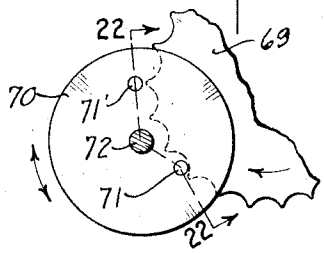


Fig. 12.

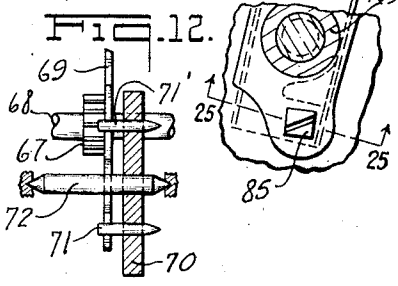


Fig. 13.

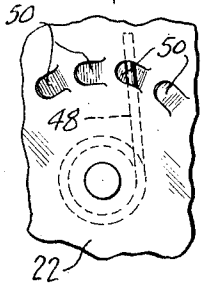


Fig. 14.

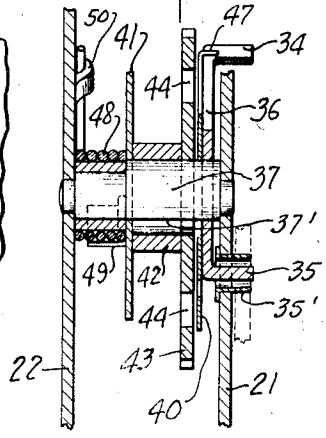
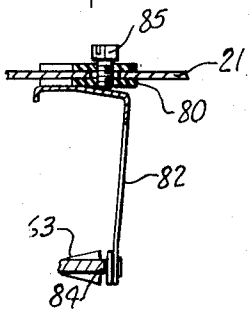


Fig. 15.



INVENTORS
Samuel F. Arbuckle
Guy. H. Coulter
Charles E. Godley

BY Brasellton, Whitcomb & Davis.
ATTORNEYS

Patented Feb. 11, 1941

2,230,994

UNITED STATES PATENT OFFICE

2,230,994

RETARDED SWITCH

Samuel F. Arbuckle, Guy H. Coulter, and Charles E. Godley, Highland Park, Mich., assignors to United Lens Corporation, Detroit, Mich., a corporation of Delaware

Application February 15, 1937, Serial No. 125,712

6 Claims. (Cl. 200—35)

This invention relates to retarded switches and is particularly directed to means for controlling the functioning of electro-responsive devices adapted to produce warning and direction signals for automotive vehicles.

The invention contemplates the provision of a circuit closing means having an adjustable delayed contact breaking action.

The invention embraces the provision of means to produce an intermittent flow of current to electrical devices for a predetermined period of time.

An object of the invention is the provision of a current controlling mechanism having adjustable means to produce a flow of current for periods of very short duration.

Another object of the invention contemplates retarded switching means to automatically flash a warning signal prior to and during the time electro-responsive devices connected thereto are in operation.

Another object of the invention is the provision of a control device including visual and audible means which will show to the operator the proper or improper functioning of the electro-responsive devices with which the control device is used.

Further objects and advantages are within the scope of this invention such as relate to the arrangement, operation and functioning of the related elements of the structure, to various details of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawings of a form of the invention, which may be preferred, in which:

Figure 1 is a top view of the switching device of the invention wth the cover broken away to show the interior details;

Figure 1—A is a sectional detail view taken substantially on the line 11—11 of Figure 1;

Figure 2 is a sectional detail view taken substantially on the line 12—12 of Figure 1;

Figure 3 is a sectional detail view taken substantially on the line 13—13 of Figure 2 looking in the direction of the arrows;

Figure 4 is a fragmentary view similar to Figure 3 showing certain parts of the device in an effective position being a bottom view thereof;

Figure 5 is a view similar to Figure 4 showing the parts of the device in another effective position;

Figure 6 is a fragmentary detail view taken substantially on the line 16—16 of Figure 2;

Figure 7 is a sectional detail view taken substantially on the line 17—17 of Figure 2;

Figure 8 is a sectional detail view taken substantially on the line 18—18 of Figure 2;

Figure 9 is a fragmentary detail side view of the contacting elements used to produce a flashing action shown in Figure 8;

Figure 10 is a sectional detail view taken substantially on the line 20—20 of Figure 7;

Figure 11 is a sectional detail view taken substantially on the line 21—21 of Figure 2 showing the escapement mechanism;

Figure 12 is a sectional detail view taken substantially on the line 22—22 of Figure 11;

Figure 13 is a fragmentary view of the adjustable spring tensioning arrangement forming a part of the invention;

Figure 14 is a sectional detail view taken substantially on the line 24—24 of Figure 7;

Figure 15 is a sectional detail view taken substantially on the line 25—25 of Figure 8 showing the means for changing the duration of the flashing action;

The features of the invention have been illustrated for use with electro-responsive devices adapted to produce warning and direction signals for automobiles but it is to be understood that the same may be used for the control of any type of electro-responsive device or wherever these features may find utility.

The switching means of the invention including the timing train or clock mechanism used to produce the delay action for controlling the circuits for the energization of electro-responsive devices is enclosed by a casing 10.

The casing 10 is preferably made of insulating material, such as a phenolic condensation product or the like and formed with its back wall removable. The casing 10 includes a narrow conduit portion terminating into an enlarged end portion providing a chamber 14 of hexagonal configuration having a depth of suitable dimensions for receiving and supporting a frame 15 carrying the timing train and circuit contacting means. Frame 15 forms a removably unitary assembly and comprises flat plates 21 and 22 of conducting material spaced apart and held in fixed relation by posts 23.

The plate 21 of frame 15 conforms generally to the shape and interior dimensions of the hexagonal chamber 14 while plate 22 is preferably of smaller size and of a rectangular form as particularly shown in Figure 1. One of the side walls of the chamber 14 is formed with an opening 16 for allowing the passage of movable cur-

rent conducting blade or switch arm 24 which terminates into an insulated end portion forming a manipulation handle 26. The handle 26 operates when moved to the right or left to close and open the circuits controlled by the switch and also the initiation of the timing train which determines the period of time during which the circuits are operative or inoperative. The switch blade or arm 24 enclosed by the housing 10 is made of current conducting material such as copper or brass. As particularly shown in Figure 3, switch blade 24 is pivotally mounted on a pin 25 fixed to the outer surface of plate 21 and is formed with a reduced end portion 27 forming part of a contacting section 29 and a camming portion 28 adjacent to the pivotal point. The contacting section 29 is adapted to engage either of the relative stationary spring contact members 30 and 31 insulatingly mounted and supported by plate 21. The width of the contacting section 29 is such that it cannot be simultaneously placed in engagement with both contact members 30 and 31, and therefore the switch arm can take the normal neutral position shown in Figure 3 or moved by handle 26 to the right or left to the positions illustrated in Figures 4 and 5 for establishing predetermined circuits.

The plate 21 is provided with curved slots 33 to permit the oscillatory movement of the projections 34 and 35 which extend therethrough and are adapted to be engaged by the opposite side walls of portions 27 and 28 of movable switch arm 24 for the purpose of winding the clock mechanism when the handle 26 is moved and for returning automatically the switch arm 24 to neutral position after a predetermined time has elapsed. An eyelet bushing 35' is mounted around projection 35 to prevent undue wear on the parts due to sliding contact of the projection with respect to camming section 28. The projections 34 and 35 form an integral part of a control switch trip bar 36, the latter being fixedly carried by the rotatably mounted member or stub shaft 37, which is journalled upon plates 21 and 22 as particularly shown in detail in Figures 8 and 14. The member 37 is formed with a longitudinal cut-away flat portion 37' upon which are also carried for rotation therewith adjacent to control bar 36, a clutch member or disk 40 and a spring retaining disk 41. Between clutch member 40 and disk 41 is located a bushing 42 and a gear 43, both journalled on member 37 for rotation relative thereto, the main gear 43 being of the usual construction and formed with a plurality of spaced radial slots 44 located adjacent to the gear teeth.

The clutch member or disk 40 is preferably of spring metal such as brass and is made with cut-away portions forming three arcuate spaced fingers 45 and an integral bent projection 47 adapted to be engaged by the control bar 36. As shown in detail in Figure 7, the fingers 45 have their ends 46 bent to a suitable angle for engaging the side walls of the slots 44 of the main gear 43, thus forming a one way driving clutch between clutch disk 40 and main gear 43, the driving connection being present when the clutch disk 40 is moved in a clockwise direction or in the direction indicated by the arrow shown in Figure 7. Located around member 37 between frame plate 22 and disk 41 is a main coil spring 48 which forms the source of energy for operating the timing train. The spring 48 has one end engaging the projection 49 forming an integral part of disk 41 and its other end retained by one of the struck-up projections or ears 50 formed on plate 22. Plate 22 as particularly shown in Figure 13, is formed with a plurality of spaced struck-up projections or ears 50 for the purpose of providing means to adjust the tension of spring 48 which is initially tensioned.

As particularly shown in Figures 1, 1—A and 2 inclusive, a gear train and an ecapement mechanism are associated with the main gear 43 for the purpose of permitting the torque produced by the tensioning of spring 48 to expend itself at a predetermined rate of speed. The gear train consisting of the pinion 52 in mesh with gear 43 and mounted on shaft 61 to impart movement thereto. Shaft 61 also carries a gear 62 and a flash wheel 63, the latter having teeth or contacting projecting surfaces 84 for a purpose which will hereinafter appear. The gear 62 is in mesh with a pinion 64 mounted on a shaft 65 which imparts motion to a gear 66 also mounted on the shaft 65 journalled on plates 21 and 22 The gear 66 is in engagement with a pinion 67 mounted on a shaft 68. A toothed wheel 69 also mounted on the shaft 68 is adapted to be rotated by pinion 67. A flutter or escapement wheel 70 carrying angularly displaced pins 71 and 71' adapted to engage alternately the teeth of the wheel 69 is mounted on a balance shaft 72 pivoted on adjustable bearings mounted on plates 21 and 22. The teeth of wheel 69 are so shaped and the pins 71 and 71' are so placed with respect thereto so as to permit only a timed intermittent motion of wheel 69. This gear train which is actuated by the unwinding action of the spring 48 is timed by the action of the flutter wheel 70 which oscillates by the rotative action imparted on the pins 71 and 71' by teeth of wheel 69, allowing with each oscillation the passage of one tooth of the wheel 69, the arrangement not only serving as escapement mechanism but also producing a distinct audible sound or buzzing action for the purpose of indicating that the gear train is in operation.

The projection 49 of spring actuating disc 41 as shown in Figure 8 is also adapted to engage with one of the teeth 84 on the flash wheel 63 acting as stop means for the gear train when the switch blade 24 is in its central position. When the spring 48 is placed under tension by movement of lever 26 to right or left, as particularly shown in Figures 4 and 5, the rotation of the spring actuating disc 41 caused by said movement moves the lug 49 out of engagement with the teeth 84 on the flash wheel 63 thus allowing the rotation of the gear train until the projection 49 once more engages a tooth 84 of the wheel 63. Carried by the plate 21 by means of an insulating plate 80 is a spring contact member 82 the free end of which is adapted to be engaged by the teeth of the flash wheel 63. As particularly shown in Figure 9 wheel 63 is formed with three rows of spaced teeth 84 in order to not only compensate for wear but provide suitable contact surfaces. The free end of the relatively stationary spring contact 82 is movable towards and away from the teeth of wheel 63 by flexing member 82 through the use of a threaded member 85 carried by the insulating plate 80 having an end contacting with contact member 82 as shown in Figures 8 and 15. This arrangement provides means to produce

flashes of very short duration highly effective for producing efficient signals visible under adverse conditions and also permits changing the length of time or duration of engagement of contact 82 with wheel teeth 84 thereby regulating at will the duration of the flash produced by the engagement of contact 82 and projections 84.

The conducting frame plate 21 when in position in the insulated switch casing 10 is connected through a suitable fuse (not shown) to the live or ungrounded terminal of a storage battery or other suitable source of energy. The switch blade 24 is in electrical contact with plate 21 by the pivot pin 25 and when it is moved to the right or left engages the spring contacts 30 and 31 controlling the electrical flow of current to the devices connected to the contacts.

As particularly shown in Figure 3, spring contacts 30 and 31 are formed integral with the bus bars 100 and 101 supported on the plate 21 by blocks 102 and 103 of insulating material. Bus bars 100 and 101 are connected to the light source terminals carried by the base of a lamp bulb 104 acting as a tell-tale device. The lamp bulb 104 is removably carried by projection 18 of casing 10 and as particularly shown in Figures 1, 1—A and 2 inclusive, is enclosed by a removable translucent cover 105 of suitable material which protects the lamp bulb from damage and is preferably of a color to project a colored light giving a definite tell-tale indication when the light source is energized.

Suitably spaced from the plate 21 by means of posts 106, 107, 108 and 109 is a removable plate 112 of insulating material carrying a movable contacting member or spider 114 pivotally mounted as at 115. A pin 116 of insulating material mounted on the lever 24 and the same is adapted to engage slot 118 on a central projection of spider 114. The spider 114 has two outwardly extending fingers 120 and 121 the ends of which are formed to selectively contact with portions 125 and 126 of the bus bars 100 and 101 when the spider 114 is moved to the position illustrated in Figures 4 and 5 by the action of the manipulating switch arm 26. The spider 114 is so arranged that when the switch arm 26 is in its central position fingers 120 and 124 are out of engagement with their respective contacting surfaces 125 and 126 as shown in Figure 3.

The insulating plate 112 is provided with spaced openings adapted to accommodate the ends of metal posts 106, 107, 108 and 109, inclusive, and is removably held in position by means of screws 150, 151, 152 and 153 which are received on threaded openings formed on the end of each post. The screws 150 to 153, inclusive, serve as circuit terminals for securing conductors to the different elements of the switching mechanism. The screw 150 serves as a connecting terminal for contact 30 and the bus bar 100 while screw 151 acts as a terminal for establishing a connection to contact 31 and bus bar 101. The screw 152 serves as a terminal to establish a connection to both the spider member 114 through member 154 contacting therewith the spring contacting element 82 through post 109. The screw 153 serves as a terminal for a conducting plate 157 secured to the outer surface of the insulating plate 112 as particularly shown in Figure 6. The conducting plate 157 is formed with a bent projection 158 passing through an opening 159 formed on the plate for the purpose of engaging and establishing an electric contact with raised portion 156 formed on the switch arm 24 when the same is in central position as particularly shown in Figures 1—A and 2. It should be noted that this engagement of projection 158 with the switch arm raised portion 156 does not take place whenever the switch plate 24 is moved to the positions shown in Figures 4 and 5.

The circuit controlling mechanism or retarded switch including the time gear train and flashing means actuated thereby is particularly adaptable to use with a signalling device forming a unit serving to produce tail-light, stop and back-up warning signals, as well as direction signals by the use of a plurality of light sources in association with electro-responsive means operable to move shutters for producing outlines of directional arrows. The particular construction of these signalling devices is fully disclosed and described in co-pending application Serial No. 740,400, filed August 18, 1934, now Patent No. 2,141,188 of December 27, 1938.

The operation of the retarded switch when used with signalling devices for vehicles can be summarized as follows: If the user of the switch such as a driver of the vehicle desires to make a right hand turn it will only be required to move the switch operating handle 26 to the right.

When the switch blade 24 located in "right" position, the other parts of the switch will be moved into the positions shown in Figure 4, it being remembered that the latter is a bottom view of the switch and therefore the switch blade 24 will appear in opposite relationship, as compared with Figure 1. As shown in Figure 4 the switch blade 24 directly connected to the battery by frame plate 21 is moved into electrical engagement with contact 31, thus establishing a flow of current to an electric right hand turn indicating device or other suitable electro-responsive devices connected to post or terminal 151.

In addition the movement of switch blade 24 to the position shown in Figure 4 winds up the main spring 48 by moving the projection 35 of the trip bar 36 rotating thereby shaft 37 which cause the clutch fingers 45 to move counterclockwise to override the slots 44 of gear 43, concurrently moving the lug 49 of the spring disc 41 out of engagement with the teeth 84 on the flash wheel 63. When this movement is completed the gear train will start its rotation due to the force stored by the winding up of spring 48 as the clutch fingers 45 will rotate the gear 43 by their engagement with the slots 44, rotating the flashing gear 63 and causing teeth 84 to engage the spring contact 82, causing the intermittent energization of suitable electro-responsive devices connected to terminal 152 such as light sources producing light flashes of very short duration attracting the attention of observers to the signalling device.

It will also be noted by reference to Figure 4, that the contacting spider 114 has been rotated by the movement of blade 24 into a position where one of its arms 120 is in contact with the portion 125 of the bus bar 100. This contact exists for a shorter duration than that of the switch blade 24 with the stationary contact 31 as the return movement of the blade 24 causes spider 114 to rotate and break such contact prior to the break of switch blade contact. While this contact is made it forms a parallel circuit including the tell-tale device 104 bridging contacts

82 and 84, this circuit includes from spring contact 82, the conducting plate 154 connected to spider finger 120 in engagement with contacting portion 125 of bus bar 100 to the terminal of tell-tale light 104 in engagement therewith and from the other light terminal by means of bus bar 101 to contact 31 in engagement with switch blade 24 to switch plate 21 and hence to contact teeth 84. It is important to note that when this parallel branch circuit is established and the contacting teeth 84 and spring contact 82 are out of engagement the tell-tale light 104 is connected in series with the electro-responsive devices or the light sources connected to terminal post 152 and due to the total resistance of the circuit the current flowing is only sufficient to energize the tell-tale device. However, when this branch parallel circuit is bridged by the engagement of the flash wheel teeth 84 with spring contact 82 full energization of light sources connected to terminal post 152 takes place and the tell-tale light 104 is rendered ineffective, thus causing a flashing action of the light sources or the electro-responsive devices connected to post 152 and alternate flashing of tell-tale light 104. This particular arrangement of circuit connections not only inform the switch operator or driver by the flashing action of tell-tale light 104 that the light sources or the electro-responsive devices connected to post 152 are operating properly, but should the light sources or electro-responsive devices connected to post 152 become inoperative or the circuit rendered ineffective such defects will be indicated, as under such conditions the tell-tale 104 will not be energized to produce a flashing action. This circuit arrangement will also indicate the ineffective operation of the flashing wheel or teeth 84 to make contact with spring contact 82 as the tell-tale will remain lighted, indicating an abnormal operating condition of the system.

In order to prevent any interference with the production of the flashing of light sources or the electrical devices connected to post 152 when the same are also controlled by the operation of any other switch such as the well-known stop switch used in an automobile, the energization of the light sources through the closure of stop switch or auxiliary switch is also controlled by the switch blade 24 by connecting to the post 153 the end of the conductor which is normally connected to the live battery terminal so that when the blade 24 is moved to produce direction signals the circuit for the flow of current to the stop switch or the auxiliary switch is open by moving the raised portion 156 from contacting engagement with finger 158 of plate 157. However, this circuit is normally closed when the switch blade 24 is in its central position whereby the closing of the auxiliary switch or stop switch fully controls the light sources to produce stop light signals.

The unwinding action of spring 48 causes the switch blade 24 to be gradually moved back toward its central position by the projection 35 of trip bar 36 contacting with the camming portion 28 of the switch blade 24, and will cause, first: to move out of engagement the finger 120 with contacting portion 125 interrupting the circuit to the tell-tale light 104 through the use of the insulated connection 116 between spider 114 and switch blade 24, and second: to interrupt the engagement of switch blade contacting portion 29 with stationary contact 31 and concurrently moving the projection 49 of spring disc 41 into engagement with a tooth 84 of wheel 63 to stop the gear train whereby the switch blade 24 and associated parts are in the position shown in Figure 3. In the embodiment shown, due to the position of one end of spring 48 in the fourth struck-up ear 50 of plate 22, the return action to central position of blade 24 is timed through the gear train and escapement mechanism to require a period of approximately 15 seconds, a period long enough to complete the average turn, and during this length of time the signalling devices are maintained energized and at the same time the light sources or devices connected to post 152 are intermittently flashed by the periodic engagement of teeth 84 of flashing wheel 63 with spring contact 82 and after this time has elapsed engagement between contact portion 29 and stationary contact 31 is broken, interrupting the flow of current to the devices connected to switch post 151 stopping their operation as well as that of the devices or light sources connected to post 152

As hereinbefore pointed out, when engagement between projection 49 and teeth 84 takes place, the spring contact 82 is out of engagement with any of the flashing wheel teeth 84, so that when the switch blade 24 is in a central position no current is passing to the light source or devices connected to post 152 through the spring contact 82. It should be noted that when the switch blade 24 reaches its central position, the engagement of projection 158 with switch blade raised portion 156 takes place and the light sources or devices connected to post 152 are capable of being energized by movement of the auxiliary switch such as a stop switch or transmission switch.

If the switch operator such as a driver of a vehicle desires to indicate his intention to make a left hand turn or energize the electrical device connected to the switch post 150 the switch handle 26 is moved to the left causing the switch blade 24 and associated part movable therewith to take the position shown in Figure 5 wherein it can be seen that switch blade contacting portion 29 is in engagement with contact 30 thus establishing a flow of current to the signalling apparatus or electro-responsive devices connected to post 150 so as to indicate that a turn to the left is going to be made by the vehicle. The movement of switch blade to the left will cause: the engagement of finger 121 with contacting surface 126 and by the engagement of switch balde portion 27 with trip bar projection 34, the rotation of shaft 37 causing the clutch fingers 45 to move counterclockwise to override the slots 44 and simultaneously move the projection 49 out of engagement with the flash wheel teeth 84 winding up spring 48 to impart rotating torque to gear 43.

When the movement of the switch blade 24 to the left is completed the torque action on gear 43 will cause the engagement of clutch fingers 45 with slots 44 of gear 43, to start the rotation of the gear train whereby the flash wheel teeth 84 are moved into engagement with spring contact 82 causing the light sources or electrical device connected to post 152 to produce lighting flashes of very short duration for attracting the attention of observers that a left turn direction signal is being produced by the signalling devices. When the switch blade 24 is moved to the "left" position the branch or parallel circuit formed across the flash wheel teeth 84 and spring con-

tact 82 includes from spring contact 82 to the plate 154 connected to spider 114 to contact 121 in engagement with contact 120 of bus bar 101 to a terminal of tell-tale 104 by bus bar 101 and from the other light terminal by bus bar 100 to contact 30 in engagement with switch blade contacting section 29 and through plate 21 to flash wheel teeth 84. The flashing action of the tell-tale 104 and light sources or electrical device connected to post 152 being produced when such branch circuit is established as hereinbefore explained in connection with the production of a right hand turn operation. It should be noted that when the switch blade is moved to "left" position the timed returning action to central position is caused by the movement of projection 34 which engages end portion 27 of switch blade 24, movement of the switch blade to "left" position will also serve to interrupt the engagement of projection 160 with switch blade raised portion 156 thus rendering the control of the light sources or electrical device connected to post 152 by the stop auxiliary switch such as and back-up switches ineffective.

It is important to note that the invention includes as hereinbefore pointed out means to indicate by audible sounds or a buzzing action that a directional signal is being produced after the tell-tale 104 has produced visual signals so that the driver is aware of the operation of the direction signals while turning the vehicle and should this audible sound cease before the turning operation is completed it will only be necessary to move again the switch handle to the proper position. In addition the switch blade 24 is so connected with the trip bar 35 that the same can be moved instantly to the opposite direction permitting an instant energization of either of the electro-responsive devices connected to switch post 150 or 151.

It is apparent that, within the scope of the invention, modifications and different arrangements may be made other than is herein disclosed, and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

What we claim is:

1. In combination switching means normally in open circuit position being manually operable to selectively and temporarily complete an electric circuit for the energization of an electro-responsive device; a mechanism rendered operable by the movement of said switching means to circuit completing position; means actuated by said mechanism in engagement with said manually operable switching means for moving the same to its normal open circuit position after a predetermined period of time; a spring being placed under tension by the movement of said manual switching means to circuit completing position for actuating said mechanism; and means for holding said spring in different positions to change the tension set up in said spring by the movement of said switching means whereby the time period of actuation of said mechanism for moving the switching means to normal open circuit position is varied.

2. In combination, a plurality of spaced contacts; a switch member manually movable to selectively and temporarily engage either of said contacts to complete an electric circuit for the energization of an electro-responsive device; a timed operated mechanism adapted to be set in motion by the movement of said switch member to contact engaging position; means driven by said mechanism in engagement with said switch member for returning the same to the no-circuit position after a predetermined period of time; a spring initially under tension for actuating said mechanism and being wound by the movement of said switch member to contact engaging position; and means for holding said spring in different positions to change its initial tension whereby the time period of actuation of said mechanism can be changed.

3. In combination, manually operable switching means to selectively and temporarily complete an electric circuit for the energization of an electro-responsive device; a mechanism rendered operable by the movement of said switching means to circuit completing position; means actuated by said mechanism in engagement with said manually operable switching means for moving the same to circuit open position after a predetermined period of time; a coil spring initially under tension for actuating said mechanism; said coil spring having one end cooperating with said switching means whereby the same is placed under increased tension by the movement of said manual switching means to circuit completing position; and means for holding the other end of said spring in different positions to change its initial tension whereby the time period of actuation of said mechanism is changed.

4. In combination, switching means normally in open circuit position being manually operable to selectively and temporarily complete an electric circuit for the energization of an electro-responsive device; a timed device rendered operable by the movement of said switching means to circuit completing position; means actuated by said device in engagement with said manually operable switching means for moving the same to circuit open position after a predetermined period of time; a secondary circuit making and breaking means connected in series with said switching means including a stationary contact and a rotatable member having a plurality of contacting elements in a staggered relationship connected together, the rotatable member being operated by said timed device to cause said contacting elements to periodically engage said stationary contact whereby an intermittent flow of current through said manual switching means is produced during the period said timed device is in operation.

5. In combination, switching means normally in open circuit position being manually operable to selectively and temporarily complete an electric circuit for the energization of an electro-responsive device; a mechanism set into operation by the movement of said switching means to circuit completing position; means actuated by said mechanism for returning said manually operable switching means to circuit open position after a predetermined period of time; a stationary contact; a rotatable contact member cooperating with said stationary contact both of said contacts being connected in series with said switching means, said rotatable contact member being driven by said timed mechanism to periodically engage said stationary contact for causing an intermittent energization of the electro-responsive device; and means to change the initial position of the stationary contact with respect to the rotatable contact member for changing the duration of the periods of energization of the electro-responsive device during the time said mechanism is returning said manually operable switching means to circuit open position.

6. In combination, switching means normally in open circuit position being manually operable to selectively and temporarily complete electric circuits for the energization of a plurality of electro-responsive devices and a tell-tale device, the latter located within observable distance from the switch operator; a timed mechanism set into operation by the movement of said switching means to circuit completing position; means actuated by said timed mechanism for returning said manually operable switching means to circuit open position after a predetermined period of time; a stationary contact; a rotatable contact cooperating with said stationary contact, said contacts being connected in series with said switching means, said rotatable contact being driven by said timed mechanism to periodically engage said stationary contact for causing an intermittent energization of the electro-responsive device and successively establishing a circuit in which the tell-tale device located within observable distance from the switch operator is connected in series with one of the electro-responsive devices for indicating to the switch operator by the intermittent energization of the tell-tale device the proper functioning of the other electro-responsive devices.

SAMUEL F. ARBUCKLE.
GUY H. COULTER.
CHARLES E. GODLEY.