June 15, 1954 J. R. HOLLINS 2,681,394

FLASHER DEVICE

Filed Jan. 9, 1952

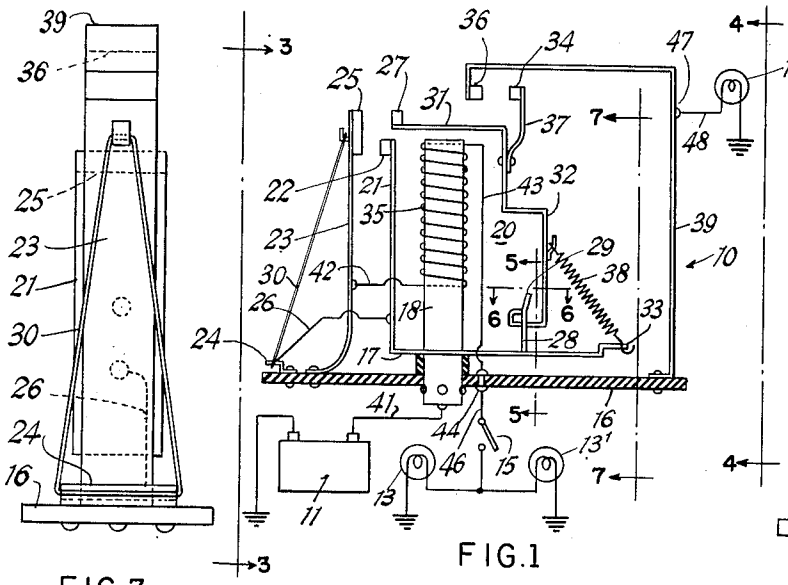


FIG. 1

FIG. 3

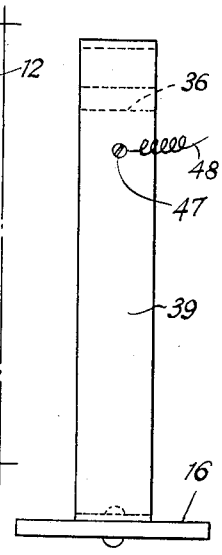


FIG. 4

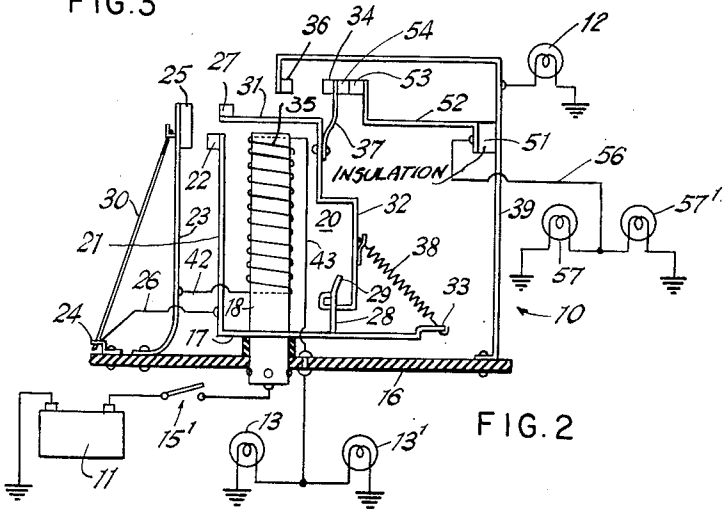


FIG. 2

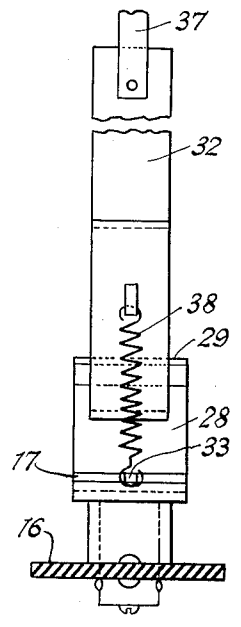


FIG. 7

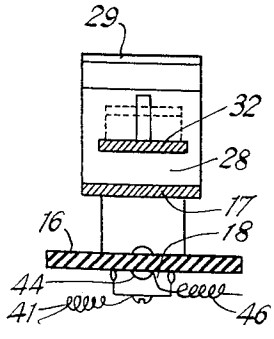


FIG. 5

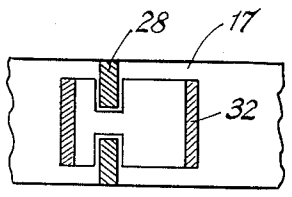


FIG. 6

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FLASHER DEVICE

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8 Claims. (Cl. 200—88)

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This invention relates to periodic circuit interrupters, commonly known as "flashers," as used in signalling circuits to flash signal lamps. More particularly, the invention relates to an improved flasher having a novel self-cleaning contact arrangement.

Flashers of the type used in automotive vehicle signalling arrangements are generally of the thermal type, including a high resistance or "hot" wire of "Nichrome" or the like initially in the the signal circuit. When the circuit control switch is closed, the resistance wire is included in the lamp circuit. Its resistance is sufficiently high to prevent sufficient current flow to the signal lamps to illuminate the latter.

The current flowing through the high resistance wire causes the latter to become hot and expand. This expansion allows a pair of contacts, in shunt relation to the hot wire to close, allowing sufficient current flow to illuminate the signal lamps. However, the shunted resistance wire cools and contracts to break the shunt circuit so that all current must again flow through the resistance wire. This operation is cyclically repeated, effecting flashing of the signal lamps.

The usual vehicle source of electrical energy is D. C., including a battery and a D. C. generator. Thus, the current flow through the flasher is D. C. As is known to those skilled in the art, unidirectional current flow across a pair of make and break contacts, which arc when they are separated, under load, causes a mound to form on one contact and pitting of the other contact. This is due to the unidirectional current flow across the arc formed by the breaking contacts, and has resulted in inefficiency and short life of flashers. At the least, frequent dressing and replacement of the contacts is necessary, representing a maintenance expense.

The present invention is directed to a novel contact arrangement for flashers, in which arcing of the contacts is substantially reduced. Even more important, one of the contacts is arranged to wipe over the other contact during separation, thereby effecting automatically a cleaning or dressing of the contacts each cycle of flasher operation. Consequently, the efficiency of the flasher remains substantially unimpaired, the contact life is very substantially lengthened, and the necessity of dressing of the contacts is reduced to a negligible amount.

A further feature of the invention is the provision of a relay armature carrying the wiping contact, and which is spring biased to the contact open position. This armature is so mounted

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as to follow the movement of a contact carried by a resistance wire controlled spring arm, as the latter is moved by contraction of the resistance wire, for a predetermined travel. The two contacts then disengage, deenergizing the relay, and the spring snaps the armature back making a quick contact break and thus reducing arcing of the contacts. As the relay armature follows the spring arm, the two contacts wipe over each other to clean or dress the contacts.

For an understanding of the invention principles, reference is made to the following description of a typical embodiment thereof as illustrated in the accompanying drawing. In the drawing:

Fig. 1 is a part elevational and part sectional view of the invention flasher in the inoperative or open position, and schematically illustrating a source of power and a signal circuit connected to the flasher;

Fig. 2 is a view similar to Fig. 1 of a modified arrangement for effecting alternating flashing of signal lamps.

Fig. 3 is a left end elevation view, on the line 3—3 of Fig. 1, of the flasher of Fig. 1;

Fig. 4 is a right end elevation view, on the line 4—4 of Fig. 1, of the flasher of Fig. 1; and

Figs. 5, 6 and 7 are sectional views taken on the correspondingly numbered lines of Fig. 1, illustrating the conventional pivoting mounting of the relay armature on the relay frame.

Referring to Fig. 1, the invention flasher 10 is illustrated in connected circuit relation with a grounded battery 11, a grounded pilot lamp 12, and a control switch 15 for selectively energizing grounded signal lamps 13, 13'.

Flasher 10 includes a dielectric base 16 on which is fixedly mounted a metal frame 17 including an electrically conductive core 18 of a relay 20 fixedly mounted on frame 17. One upstanding arm 21 of frame 17 carries an outwardly facing contact 22. Adjacent this arm is a flat spring 23 secured to base 16 and carrying a contact 25 at its free end, spring 23 normally tending to engage contact 25 with contact 22. A high resistance wire 30, of "Nichrome" or the like, is anchored at one end to the outer end of spring 23, and at the other end, to a terminal 24 on base 16. Normally, wire 30 holds spring 23 away from frame arm 21.

Contact 25 is of such length and so mounted that it projects at least slightly beyond contact 22, extending sufficiently inwardly to have adequate surface engagement with contact 22. A conductor 26 connects frame arm 21 to terminal

24. Contact 25, when engaged with contact 22, is arranged to be engaged by a contact 27 on the outer end of arm 31 of relay armature 32. Due to the projection of contact 25 outwardly beyond contact 22, contact 27 does not engage contact 22.

Armature 32 is mounted through arm 28 of frame 17, this arm forming a fulcrum for the armature and having a reentrant outer end 29 acting as a limit stop for the armature. The pivotal mounting of armature 32 on arm 28 of frame 17 is conventional, as best seen in Figs. 1, 5, 6 and 7. The armature is spring biased to the contact disengaging position by a relatively strong tension spring 33 connected between the armature and the end 33 of frame 17. Secured to armature 32 is a spring 37 carrying a contact 34. This latter is engageable with a contact 36, on a fixed arm 39 secured to base 18, when contacts 25 and 27 are engaged.

Battery 11 is connected by conductor 41 to core 18 and frame 17. A conductor 42 connects one end of relay coil 35 to spring 23. A conductor 43 connects the other end of coil 35 to terminal 44 connected by conductor 46 to switch 15. Terminal 47 and conductor 48 connect arm 37 to pilot lamp 12.

Flasher 10 operates in the following manner: When switch 15 is closed current flows from battery 11 through conductor 41, core 18, frame 17, arm 21, conductor 26, terminal 24, resistance wire 30, spring 23, conductor 42, coil 35, conductor 43, terminal 44, conductor 46, control switch 15, and the signal lamps 13, 13' to ground. Due to the high resistance of wire 30, the current flow is insufficient either to operate relay 20 or to effect sensible illumination of the signal lamps.

As wire 30 becomes hot, due to current flow, it expands, allowing spring 23 to engage contact 25 with contact 22. This shunts wire 30, allowing current to flow from battery 11 through conductor 41, core 18, frame 17, arms 21, and through contacts 22, 25, spring 23, and conductor 42 to coil 35. The current flow is now sufficient to operate relay 20 and to illuminate the signal lamps.

As a result of full energization of relay coil 35, armature 32 is now pulled toward the upper end of core 18, swinging counter-clockwise to engage its contact 27 with contact 25, and to engage its contact 34, on spring 37, with contact 36. Engagement of contacts 25 and 27 establishes the following circuit in parallel with the circuit including arm 21, contact 22 and contact 25: battery 11, conductor 41, core 18, frame 17, armature 32, arm 31, contact 27 and contact 25. Thus, there are now two parallel energizing circuits for relay coil 35. Engagement of contacts 34 and 36 energize pilot lamp 12 over the following circuit: battery 11, conductor 41, frame 17, armature 32, spring 37, contacts 34 and 36, arm 39, conductor 48, and pilot lamp 12.

Due to the shunting of high resistance wire 30, the latter cools and contracts. As wire 30 contracts, it draws the upper end of spring 23 to the left, or counterclockwise, disengaging contact 25 from contact 22. As these contacts are in one of two parallel energizing circuits for coil 35, there is substantially no current load on contacts 22 and 25 as they separate, as the full current for relay coil 35 will be carried through the circuit including contacts 25 and 27, this circuit maintaining coil 35 fully energized. As there is substantially no load on contacts 22, 25 as they separate, there will be substantially no arcing between these contacts.

As contact 25 is moved to the left or counter-clockwise by contraction of wire 30, armature 32 continues to swing counter-clockwise due to the full energization of relay coil 35 resulting in the pull of core 18 on armature 32 being maintained. Contact 27 thus remains engaged with contact 25 but, due to the relative motions of spring 23 and armature 32, contacts 25 and 27 have relative movement while remaining in surface-to-surface engagement. Thus, these contacts wipe over each other resulting in a cleaning or dressing of the contact surfaces.

The limit of counter-clockwise movement of armature 32 is determined by engagement of the armature with the upper end of core 18. At the limit of movement of armature 32, with spring 23 still being pulled to the left by contraction of wire 30, contacts 25 and 27 are separated. This breaks the shunting circuit around high resistance wire 30 and which has been maintaining full energization of relay coil 35. The current through coil 35 is thus substantially instantaneously reduced to a value insufficient to effect full energization of the coil so that spring 33 snaps armature 32 counter-clockwise. This quick breaking action by the contacts 25 and 27 substantially eliminates any arcing across these contacts. At the same time, contacts 34 and 36 are snapped apart due to the snapping of armature 32 clockwise by spring 33. This breaks the pilot lamp energizing circuit, with the quick break substantially eliminating arcing of contacts 34 and 36. The current flow, due to inclusion of high resistance wire 30 in the energizing circuit for the relay and for lamps 13, 13', is insufficient to effectively energize these lamps.

Should a signal lamp be defective, the current flow through coil 35, in series with the signal lamps, will be insufficient to fully energize the coil so that armature 32 will not be drawn toward the upper end of core 18. As wire 30 expands and contracts, spring 23 will flex back and forth alternately engaging and disengaging contacts 22 and 25. However, as relay armature 32 is not operated, contacts 34 and 36 will not be engaged so that pilot lamp 12 will not be lit. Thus, the operator is apprised of a defective signal lamp condition by the failure of the pilot lamp to light. The relatively low current flow across contacts 22 and 25, due to one of the signal lamps being defective, will not be sufficient to cause pitting or damaging of these contacts.

Fig. 2 illustrates an alternative arrangement, whereby sets of signal lamps may be flashed in alternation. The same reference characters have been used to designate the same elements.

In this arrangement, control switch 15 is replaced by a control switch 15' between battery 11 and the relay. An insulating block 51 on the inner side of arm 39 supports a conductive metal arm 52 extending toward armature 32 and carrying a contact 53 which is engaged by a back contact 54 on the outer side of spring 37 when armature 32 is at the limit of its clockwise movement under the influence of spring 33. Arm 52 is connected by a conductor 56 to grounded signal lamps 57, 57'.

When switch 15' is closed, current flows from battery 11 through switch 15', core 18, frame 17, armature 32, spring 37, contacts 54 and 53, arm 52, conductor 56, and lamps 57, 57'. Thus, these latter lamps are initially energized. When armature 32 is swung counter-clockwise as a result of full energization of relay coil 35, as previously described, contacts 53 and 54 are separated, thus

breaking the energizing circuits of lamps 57, 57'. At the same time, engagement of contact 25 with contact 22 will have completed the shunt circuit around resistance wire 30, effecting full energization of coil 35 and lamps 13, 13'. This circuit is supplemented by a second shunt circuit when armature contact 27 engages contact 25, as has been previously described. Engagement of contacts 34 and 36, when armature 32 is swung counter-clockwise, lights pilot lamp 12. When high resistance wire 30 contracts, resulting in eventual snapping of armature 32 clockwise under the influence of spring 38, lamps 13, 13' and pilot lamp 12 are extinguished, and lamps 57, 57' are relit when contact 54 re-engages contact 53. Thus, lamps 57, 57' are flashed in alternation with lamps 13, 13', pilot lamp 12 being flashed in synchronism with lamps 13, 13''.

The foregoing construction thus provides a durable flasher having low contact maintenance. Additionally, the pilot lamp circuit is independent of the relay coil circuit, and so arranged as to indicate when a signal lamp is defective.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the invention principles, it will be understood that the invention may be otherwise embodied without departing from such principles.

What is claimed is:

1. A flasher comprising, in combination, a supporting base a fixed contact, a movable contact supported on said base, a high resistance wire connected to said base and to said movable contact and arranged, when shunted, to disengage said movable contact from said fixed contact, means biasing said movable contact to engage said fixed contact to complete a first shunt circuit for said resistance wire, a relay including a metal frame supporting said fixed contact, a metal core connected to said frame, an operating coil on said core connected in circuit with said movable contact and said resistance wire, and a movable metal armature pivoted on said frame included in a second shunt circuit for said resistance wire, said relay coil being included in both shunt circuits, said armature carrying a third contact engageable with said movable contact when said coil is energized through said first shunt circuit closed by engagement of said movable contact with said fixed contact, said armature swinging toward said movable contact as the latter is retracted by contraction of said high resistance wire so that said movable contact and said third contact wipe over each other, and said movable contact disengaging said third contact to break said second shunt circuit, in the full retracted position of said movable contact, to deenergize said relay coil, and spring means connected to said frame and armature and operable to bias said armature away fom said movable contact when said relay coil is deenergized.

2. A flasher comprising, in combination, a supporting base a fixed contact, a movable contact supported on said base, a high resistance wire connected to said base and said movable contact and normally biasing said movable contact away from said fixed contact, means biasing said movable contact to engage said fixed contact, a relay including an operating coil on said core and a movable metal armature pivoted on said frame, a circuit including a metal frame supporting said fixed contact, a metal core connected to said frame said fixed contact, said resistance wire, said movable contact, and said coil in series relation, effective to heat said resistance wire to expand the latter, a first relay energizing circuit, in shunt with said resistance wire, and including said fixed contact and said movable contact, in engagement when the resistance wire expands, and said relay coil, said armature carrying a third contact engageable with said movable contact when said coil is energized, and a second relay energizing circuit, in shunt with said resistance wire, and including said third contact, said movable contact, and said relay coil, said armature swinging toward said movable contact as the latter is retracted by contraction of said high resistance wire so that said movable contact and said third contact wipe over each other, and said movable contact disengaging said third contact to break said second shunt circuit, in the fully retracted position of said movable contact, to deenergize said relay coil, and spring means connected to said frame and armature and operable to bias said armature away from said movable contact when said relay coil is deenergized.

3. A flasher comprising, in combination, a dielectric base, a metal relay frame mounted on said base, a relay coil mounted in said frame, a metal core connected to said frame and mounted in said coil, a metal armature hingedly mounted on said frame in conductive relation therewith and carrying a first contact, a metal spring member mounted on said base and extending toward said armature, said spring member having a second contact extending therealong in a direction substantially perpendicular to said first contact in the operated position of said armature, a high resistance wire connected to said spring member and said base and normally biasing said spring member to a position retaining said second contact out of the line of movement of said first contact, a fixed contact carried by said relay frame and engageable by said second contact under the bias influence of said spring member when said resistance wire is heated and expands, the fixed contact being disposed inwardly of the edge of said second contact nearest said first contact whereby said first contact, when said armature is operated, will engage only the outer edge of said second contact, a circuit including said fixed contact, said resistance wire, said second contact, and said coil in series relation, effective to heat said resistance wire to expand the latter, a first relay energizing circuit, in shunt with said resistance wire, and including said fixed contact and said second contact, in engagement when the resistance wire expands, and said relay coil, and a second relay energizing circuit, in shunt with said resistance wire, and including said first contact, said second contact, and said relay coil, said armature swinging toward said spring member as the latter is retracted by contraction of said high resistance wire so that said first contact and said second contact wipe over each other, and said second contact disengaging said first contact, in the fully contracted condition of said resistance wire, to break the relay energizing circuit, and spring means operable to bias said armature away from said second contact when said relay coil is deenergized.

4. A flasher comprising, in combination, a dielectric base, a metal relay frame mounted on said base, a relay coil mounted in said frame, a metal core connected to said frame and mounted in said coil, a metal armature hingedly mounted on said frame in conductive relation therewith and carrying a first contact, a metal spring mem-

ber mounted on said base and extending toward said armature, said spring member having a second contact extending therealong in a direction substantially perpendicular to said first contact in the operated position of said armature, a high resistance wire connected to said spring member and said base and normally biasing said spring member to a position retaining said second contact out of the line of movement of said first contact, a fixed contact carried by said relay frame and engageable by said second contact under the bias influence of said spring member when said resistance wire is heated and expands, the fixed contact being disposed inwardly of the edge of said second contact nearest said first contact whereby said first contact, when said armature is operated, will engage only the outer edge of said second contact, a circuit including said fixed contact, said resistance wire, said second contact, and said coil in series relation, effective to heat said resistance wire to expand the latter, a first relay energizing circuit, in shunt with said resistance wire, and including said fixed contact and said second contact, in engagement when the resistance wire expands, and said relay coil, a second relay energizing circuit, in shunt with said resistance wire, and including said first contact, said second contact, and said relay coil, said armature swinging toward said spring member as the latter is retracted by contraction of said high resistance wire so that said first contact and said second contact wipe over each other, and said second contact disengaging said first contact, in the fully contracted condition of said resistance wire, to break the relay energizing circuit, spring means operable to bias said armature away from said second contact when said relay coil is deenergized, a third contact carried by said armature, and a second fixed contact supported on said base engageable by said third contact, when said armature is operated, to close an auxiliary circuit including said armature.

5. A flasher comprising, in combination, a dielectric base, a metal relay frame mounted on said base, a relay coil mounted in said frame, a metal core connected to said frame and mounted in said coil, a metal armature hingedly mounted on said frame in conductive relation therewith and carrying a first contact, a metal spring member mounted on said base and extending toward said armature, said spring member having a second contact extending therealong in a direction substantially perpendicular to said first contact in the operated position of said armature, a high resistance wire connected between the free end of said spring member and a terminal on said base, a fixed contact carried by said relay frame and engageable by said second contact under the bias influence of said spring member when said resistance wire is heated and expands, the fixed contact being disposed inwardly of the edge of said second contact nearest said first contact whereby said first contact, when said armature is operated, will engage only the outer edge of said second contact, a conductor connecting said fixed contact to said terminal, a circuit including said fixed contact, said conductor, said resistance wire, said second contact, and said coil in series relation, effective to heat said resistance wire to expand the latter, a first relay energizing circuit, in shunt with said resistance wire, and including said fixed contact and said second contact, in engagement when the resistance wire expands, and said relay coil, and a second relay energizing circuit, in shunt with said

resistance wire, and including said first contact, said second contact, and said relay coil, said armature swinging toward said spring member as the latter is retracted by contraction of said high resistance wire so that said first contact and said second contact wipe over each other, and said second contact disengaging said first contact, in the fully contracted condition of said resistance wire, to break the relay energizing circuit, and spring means connected to said frame and armature and operable to bias said armature away from said second contact when said relay coil is deenergized.

6. A flasher comprising, in combination, a dielectric base, a metal frame mounted on said base, a relay coil mounted on a metal core secured to said frame and extending outwardly therefrom, an L-shaped metal armature having one arm pivotally connected at its outer end to the frame and extending parallel to the core, and its other arm extending across the outer end of the core, a first contact on the outer end of said other arm, a frame arm extending parallel to the core on the opposite side thereof from said first armature arm, a fixed contact extending along the outer surface of the outer end of said frame arm, a spring member mounted on said base and extending in parallel spaced relation to such other arm and biased toward the same, a second contact extending along the inner surface of the outer end of said spring member and arranged to engage said first contact, said second contact extending outwardly beyond said fixed contact whereby said first contact, when said armature is operated, will engage only the outer edge of said second contact, a high resistance wire connected between the free end of said spring member and a terminal on said base, a conductor connecting said fixed contact to said terminal, a circuit including said fixed contact, said conductor, said resistance wire, said second contact, and said coil in series relation, effective to heat said resistance wire to expand the latter, a first relay energizing circuit, in shunt with said resistance wire, and including said fixed contact and said second contact, in engagement when the resistance wire expands, and said relay coil, and a second relay energizing circuit, in shunt with said resistance wire, and including said first contact, said second contact, and said relay coil, said armature swinging toward said spring member as the latter is retracted by contraction of said high resistance wire so that said first contact and said second contact wipe over each other, and said second contact disengaging said first contact, in the fully contracted condition of said resistance wire, to break the relay energizing circuit, and spring means connected to said frame and armature and operable to bias said armature away from said second contact when said relay coil is deenergized.

7. A flasher comprising, in combination, a dielectric base, a metal relay frame mounted on said base, a relay coil mounted in said frame, a metal core connected to said frame and mounted in said coil, a metal armature hingedly mounted on said frame in conductive relation therewith and carrying a first contact, a metal spring member mounted on said base and extending toward said armature, said spring member having a second contact extending therealong in a direction substantially perpendicular to said first contact in the operated position of said armature, a high resistance wire connected between the free end of said spring member and a terminal on said base,

a fixed contact carried by said relay frame and engageable by said second contact under the bias influence of said spring member when said resistance wire is heated and expands, the fixed contact being disposed inwardly of the edge of said second contact nearest said first contact whereby said first contact, when said armature is operated, will engage only the outer edge of said second contact, a conductor connecting said fixed contact to said terminal, a circuit including said fixed contact, said conductor, said resistance wire, said second contact, and said coil in series relation, effective to heat said resistance wire to expand the latter, a first relay energizing circuit, in shunt with said resistance wire, and including said fixed contact and said second contact, in engagement when the resistance wire expands, and said relay coil, a second relay energizing circuit, in shunt with said resistance wire, and including said first contact, said second contact, and said relay coil, said armature swinging toward said spring member as the latter is retracted by contraction of said high resistance wire so that said first contact and said second contact wipe over each other, and said second contact disengaging said first contact, in the fully contracted condition of said resistance wire, to break the relay energizing circuit, spring means connected to said frame and armature and operable to bias said armature away from said second contact when said relay coil is deenergized, a third contact carried by said armature, and a second fixed contact supported on said base engageable by said third contact, when said armature is operated, to close an auxiliary circuit including said armature.

8. A flasher comprising, in combination, a dielectric base, a metal relay frame mounted on said base, a relay coil mounted in said frame, a metal core connected to said frame and mounted in said coil, a metal armature hingedly mounted on said frame in conductive relation therewith and carrying a first contact, a metal spring member mounted on said base and extending toward said armature, said spring member having a second contact extending therealong in a direction substantially perpendicular to said first contact in the operated position of said armature, a high resistance wire connected to said spring member and said base and normally biasing said spring member to a position retaining said second contact out of the line of movement of said first contact, a fixed contact carried by said relay frame and engageable by said second contact under the bias influence of said spring member when said resistance wire is heated and expands, the fixed contact being disposed inwardly of the edge of said second contact nearest said first contact whereby said first contact, when said armature is operated, will engage only the outer edge of said second contact, a circuit including said fixed contact, said resistance wire, said second contact, and said coil in series relation, effective to heat said resistance wire to expand the latter, a first relay energizing circuit, in shunt with said resistance wire, and including said fixed contact and said second contact, in engagement when the resistance wire expands, and said relay coil, a second relay energizing circuit, in shunt with said resistance wire, and including said first contact, said second contact, and said relay coil, said armature swinging toward said spring member as the latter is retracted by contraction of said high resistance wire so that said first contact and said second contact wipe over each other, and said second contact disengaging said first contact, in the fully contracted condition of said resistance wire, to break the relay energizing circuit, spring means connected to said frame and armature and operable to bias said armature away from said second contact when said relay coil is deenergized, a third contact carried by said armature, and a second fixed contact supported on said base engageable by said third contact, when said armature is operated, to close an auxiliary circuit including said armature, a fourth contact carried by said armature, and a third fixed contact carried by and insulated from said frame engageable by said fourth contact, when the armature is retracted, to close a second auxiliary circuit including said armature.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,252,003	Harmon	Aug. 12, 1941
2,312,974	Owens	Mar. 2, 1943
2,440,265	Gross	Apr. 27, 1948
2,451,618	Gross	Oct. 19, 1948