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2,103,277

FLASHER DEVICE

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Fig. 1.

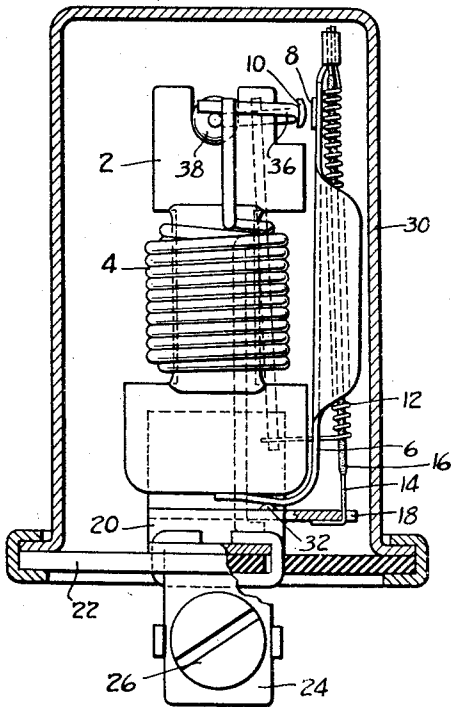


Fig. 2.

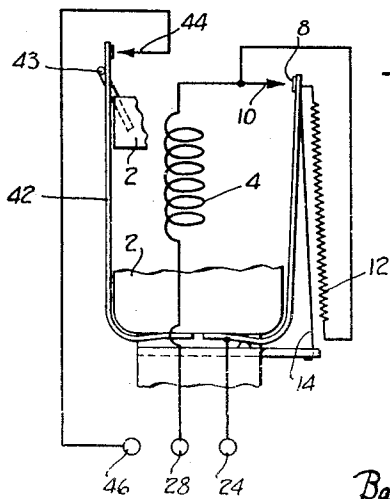
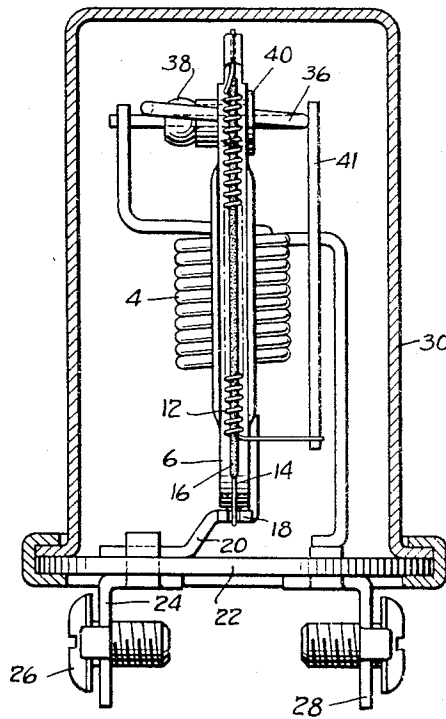


Fig. 3.

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# UNITED STATES PATENT OFFICE

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## FLASHER DEVICE

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Application March 25, 1936, Serial No. 70,761

6 Claims. (Cl. 175—373)

My present invention relates to devices for intermittently varying electrical currents and comprises an improved flasher device of this character which may be readily and economically constructed and yet which is positive in operation.

In my prior Patent No. 1,979,349, dated November 6, 1934, I have described and broadly claimed a flasher device in which a resistance is intermittently shunted upon expansion and contraction of an expansible wire forming part of the resistance; and in a co-pending application Serial No. 66,814, filed March 3, 1936, I have disclosed and claim an improved construction of the flasher device of the prior patent together with circuits controlled thereby. The device of the present application, while having many of the constructional improvements of the device of my co-pending application, and while usable in the circuits disclosed therein, differs from the earlier devices primarily in that the expansible wire forms no part of the electrical circuit of the device and is heated by radiation from the resistance to be shunted instead of by the passage of current therethrough. In this respect the present device resembles that forming the subject-matter of a co-pending application Serial No. 17,240, filed April 19, 1935, by myself and C. C. Bohner jointly. The present device differs materially however from that of the joint application, not only in construction, but also in operation, the present device being more suitable for use with heavy load and more regular in its operation.

For an understanding of the novel features of the present invention reference may be had to the accompanying drawing of which:

Fig. 1 is a front view, partly in section, of a device embodying the invention;

Fig. 2 is a side view of the device of Fig. 1; and Fig. 3 is a diagrammatic view illustrating a modified form of the invention.

As shown in the drawing, the device includes an electromagnet having a core 2 and coil 4, an armature 6 secured at one end to the core 2 and carrying at its movable end a contact 8, a fixed contact 10 positioned to be engaged by contact 8 when the armature is in attracted position and electrically connected with one end of coil 4 and with a resistance 12, the other end of which is secured to the movable end of the armature, and an expansible wire 14 positioned to be heated by radiation from resistance 12. The wire 14, which is provided with a suitable insulated coating 16 of ceramic material or the like, is welded at one

end to the movable end of armature 6 and at its other end to the under surface of a projecting arm 18 of a bracket member 20. Bracket 20 is clamped to insulating base 22 of the device by means of a plate 24 serving in conjunction with a screw 26 as one terminal of the device. The other terminal of the device comprises a plate member 28 clamped to the base 22 and welded to an end of coil 4. A cover 30 secured either permanently or detachably to the base 22 encloses the entire device.

Armature 6 has a relatively resilient curved tail portion which extends over the inner portion of bracket arm 18 and is welded at its end to the base of core 2; the side of the core being welded to a vertical wall portion of the bracket. The shape of the armature tail is such that the armature tends normally to move into attracted position. A pressed up button 32 on the bracket 20 just beneath the armature tail causes the initial opening movement of the armature to be accompanied by a buckling of the tail with consequent wiping action of contact 8 upon contact 10. The button 32 also serves as a mechanical protection of the weld between armature and core.

The armature 6, as shown, is provided with extending wing portions to increase the magnetic attraction between core and armature without substantially adding to the weight of the armature. Contact 10 is mounted on a wire 36 which is in the form of an open loop, one end of which is welded to the end of coil 4 and the other end of which is insulatedly mounted on core 2 by means of a glass tube 38 which in turn is carried within a metal eyelet 40 welded within a U-shaped groove in the upper end of the core; the glass tube being fused both to the wire 36 and to the eyelet. A wire 41 is welded to wire 36 and to an end of resistance 12. This arrangement provides a firm support of the contact 10, a means for electrically connecting the contact with resistance 12 and with the coil 4 and also a means for readily adjusting the spacing of contacts 8 and 10.

Wire 14, when cold, has a tension sufficient to hold the armature in open position. When a circuit including a source of electromotive force is connected across terminals 24 and 28, current flows from terminal 24, through armature 6, resistance 12 and coil 4 to terminal 28. The current through resistance 12, which preferably, as shown, is in the form of a helix surrounding wire 14, causes wire 14 to expand sufficiently to permit the spring action of the armature tail to move the armature to contact closing position where resist-

ance 12 is shunted; the circuit now being from terminal 24, through armature 6, contacts 8 and 10 in engagement and coil 4 to terminal 28. Upon the shunting of resistance 12 wire 14 cools and contracts, applying an initial downward pull upon the armature. This causes a buckling of the armature tail about button 32 and a wiping action of the contacts. When the contraction of wire 14 is sufficient to overcome the holding power of the magnet, the armature springs out into contact opening position with a snap action making a positive and definite opening of the contact without sparking.

From the above description of the operation of the device, it will be apparent that the current through a circuit connected in series with the device and with a suitable source of electromotive force will be periodically varied by the intermittent shunting and inclusion in the circuit of resistance 12. For example, if the series circuit contains an incandescent lamp, the lamp will be flashed in timed relation with the closing and opening of the contacts; the lamp dimming when the contacts are open and glowing brightly when the contacts are closed. The rate of opening and closing of the contacts will depend upon the diameter of wire 14 and upon the tension of the wire when cold, which tension can be adjusted readily by bending the end of arm 18 upward or downward.

As compared with flasher devices depending upon the response of bi-metallic elements to temperature changes, the present device is more regular and precise in operation than bi-metallic devices having no magnetic control and is much more rapid in operation than such devices in which magnetic control is provided. As compared with the devices forming the subject-matter of the hereinbefore mentioned co-pending joint application, the present device will operate with larger currents passing through the heater resistance and at relatively slower and more regular speed.

Because of the provision of the electromagnet, the device also lends itself to the control of more than one circuit. For example, if a second armature is employed and so secured to the core that it will move into attracted position only when the current through coil 4 is increased by the shunting of resistance 12, such armature could be used to open and close contacts of a second circuit in timed relation to the current variations imposed by armature 6 on a circuit connected to terminals 24 and 28. In Fig. 3 a device embodying the invention and provided with such a second armature is diagrammatically illustrated. The second armature, 42, is mounted upon the core of the electromagnet and tends to move away from attracted position against a suitable stop 43. A contact 44 connected to a third terminal 46 of the device is positioned to be engaged by a contact carried by the armature 42 when the armature is in attracted position. In operation, armature 42 will move to contact closing position whenever armature 6 closes contacts 8 and 10 and will move back against the stop 43 whenever the movement of armature 6 opens the contacts 8 and 10. Thus the device will operate to decrease and increase the current through a circuit connected to terminals 28 and 24 and substantially simultaneously to open and close a circuit connected to terminals 46 and 24. If the fixed contact associated with armature 42 is positioned to be engaged when the armature is in retracted instead of attracted position, alternate flashing, instead of simultaneous

flashing of lamps in the two circuits could, of course, be obtained.

The invention has now been described and the various novel features thereof discussed in connection with the drawing. It will be understood, however, that various changes might be made in the particular construction illustrated in the drawing and various features thereof omitted without departing from the spirit of the invention as defined in the accompanying claims.

I claim:

1. In a device of the character described, the combination comprising a core having two armatures each secured at one end thereto, one of said armatures being biased toward attracted position and the other being biased to retracted position, an expansible wire secured to said first mentioned armature and mechanically preventing, when cold, movement of the armature to attracted position, an energizing coil for said core, an electrical resistance connected in series with said coil and positioned to heat said wire by radiation, and means including a pair of contacts for shunting said resistance when said first mentioned armature is in attracted position whereby, when a potential difference is applied across said coil and resistance, movement of said first mentioned armature to attracted position shunts said resistance and thereby increases the current through said coil sufficiently to move said second mentioned armature to attracted position.

2. The device according to claim 1 including an insulating base carrying three electrical terminals of which one is connected to said core and one is connected to an end of said coil, said device including a second pair of contacts, one carried by that one of said armatures which is normally biased to open position and the other positioned to be engaged thereby in one position of said armature and connected to said third terminal whereby movement of the armatures intermittently varies the resistance between two terminals and intermittently opens and closes the circuit between two terminals.

3. A device of the type described comprising in combination an electrical resistance, an expansible wire positioned to be heated by radiation from said resistance upon passage of electrical current therethrough, an electromagnet including a coil connected in series with said resistance and means influenced by the expansion and contraction of said wire and co-operating with said electromagnet for intermittently shunting said resistance, said last named means including an elongated armature having a resilient tail portion secured to said core, said armature being secured at its other end to said expansible wire, and said tail portion being secured in a manner to permit movements of the other end in directions both laterally of the armature and longitudinally thereof.

4. In a device of the type described, comprising a fixed contact, an elongated armature having on one end a contact co-operating with said fixed contact, said armature being resiliently mounted at its other end to permit movements of the second named contact in directions both laterally of the armature and longitudinally thereof, a thermo-responsive element including an expansible wire rigidly fixed at one end and at its other end to the end of said armature carrying the movable contact, said expansible wire being disposed at an acute angle to the armature and adapted to cause movements of the end of the armature carrying the movable contact in both of said di-

rections and an electric circuit associated with said thermo-responsive device and contacts.

5 5. A device of the type described comprising in combination an insulated base, at least two electrical terminals carried by said base, a conducting bracket mounted on said base and electrically connected with one of said terminals, a magnetic core secured to said bracket, an armature secured at one end to said core and having, at its secured end, a resilient tail portion of such shape as to bias the armature into attracted position, a contact carried on the movable end of said armature, an expansible wire having one end secured to said bracket and its other end secured to the movable end of said armature, a fixed contact insulatedly mounted on said core and positioned to be engaged by said armature carried contact when the armature is in attracted position, a magnetizing coil for said core electrically connected between said fixed contact and another one of said terminals and an electrical resistance connected across said contacts and positioned to heat said wire by radiation upon passage of current through said resistance, the tension of said wire when cold being sufficient to mechanically prevent movement of said armature to attracted position, said bracket

having a pressed up button thereon which engages said tail portion of the armature, said tail portion buckling over said button and giving a wiping action of one contact upon the other when said wire starts to contract.

5 6. In a device of the type described, comprising a fixed contact, a movable member having on one end a contact cooperating with said fixed contact, said member being resiliently mounted at its other end to permit movement of the second named contact in directions both laterally of the member and longitudinally thereof, an expansible wire having one end secured to the movable end of said member, anchoring means for applying a tension to a length of said wire, said anchoring means holding said wire at an acute angle to the member whereby upon contraction of said wire the contact carried on the end of said member is caused to move in both of said directions and means including an electrical circuit associated with said contacts for causing expansion of said wire when the movable member is in contact opening position and contraction of said wire when the movable member is in contact closing position.

25 JOSEPH SCHMIDINGER. 25