June 5, 1928. 1,672,859

J. W. PHELPS

INTERMITTENT CURRENT DEVICE

Filed March 11, 1925 2 Sheets-Sheet 1

Fig. 1.

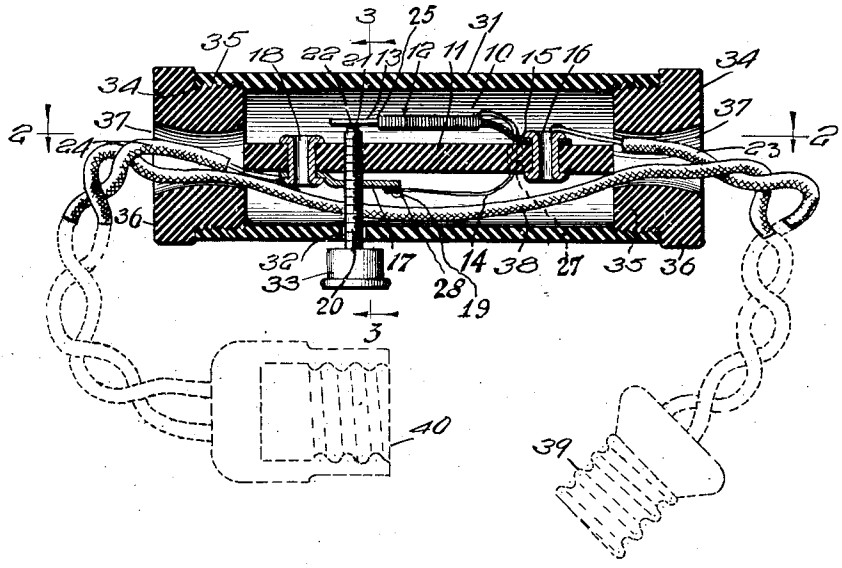


Fig. 2.

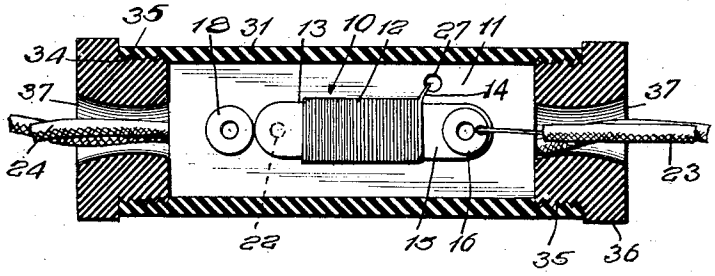
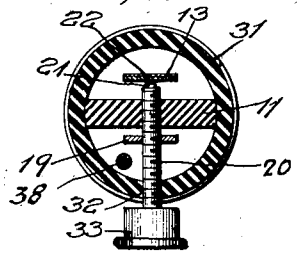


Fig. 3.



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Filed March 11, 1925 2 Sheets-Sheet 2

Fig. 4.

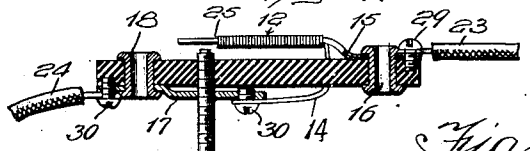


Fig. 4.

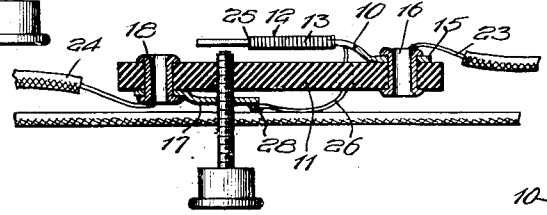


Fig. 6.

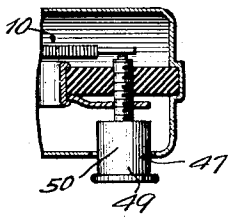


Fig. 5.

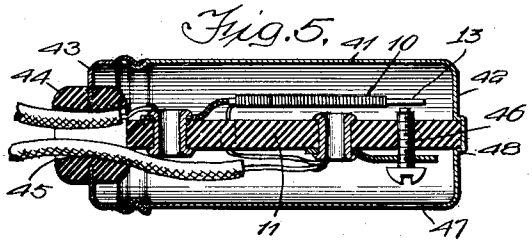


Fig. 7.

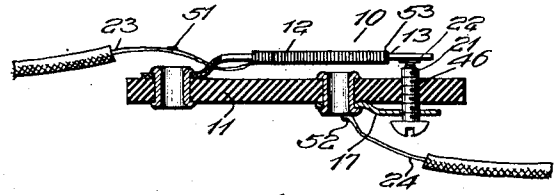
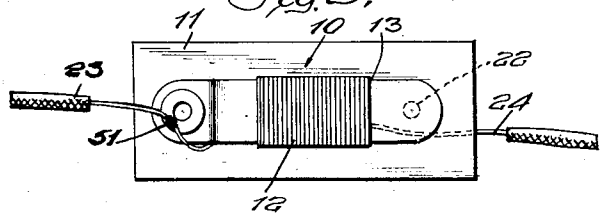


Fig. 8.



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Patented June 5, 1928. 1,672,859

UNITED STATES PATENT OFFICE.

JAMES W. PHELPS, OF CHICAGO, ILLINOIS.

INTERMITTENT-CURRENT DEVICE.

Application filed March 11, 1925. Serial No. 14,725.

My invention relates to improvements in electric circuit make and break or flashing devices, and has special reference to the provision of simple devices of the kind mentioned which can be produced at small cost and which shall be particularly adapted for use in individual lamp circuits, or, in other words, in circuits of relatively small current capacity.

A special feature of my invention relates to the provision of an extension or connecting cord adapted for the connection of a flashing lamp or similar circuit to a wall or other socket, and which shall include in one device, a connecting plug and a delivery socket connected by a double circuit cord, preferably flexible, and a simple flashing device interposed between the plug and socket and permanently connected in one wire of the double circuit.

The flasher of my invention comprises a relatively rigid flat base or body member, which carries a simple thermo make and break mechanism and adapted to be permanently connected in a flexible wire for use. Preferably the device as so far indicated is protected by a suitable casing.

One feature of my invention relates to a simple tubular casing for the flashing device proper and means for retaining the base in a predetermined relative position in the casing to the end that the periodicity of the flashing can be readily adjusted to suit the circumstances.

My invention will be readily understood by reference to the accompanying drawings, forming part of this specification, taken in conjunction with the following description and the appended claims:

Figure 1, is a longitudinal central sectional view of a make and break device embodying my invention in one form;

Figure 2, is a similar section on the line 2—2 of Figure 1;

Figure 3, is a transverse section on the line 3—3 of Figure 1;

Figure 4, is a sectional view similar to Figure 1, but showing the make and break device free of any protective shell and illustrating the electric circuit for a shunt wound device;

Figure 4ª, is similar to Figure 4 except that screws are shown for connecting the circuit wires;

Figure 5, is a sectional view similar to Figure 1, showing a slightly modified form of shell;

Figure 6, is a fragmentary sectional view similar to Figure 5, showing an adjusting contact screw extending out through a metallic shell;

Figure 7, is a view similar to Figure 5 but illustrating a series wound device; and

Figure 8, is a plan view of the device shown in Figure 7.

In said drawings 10 illustrates generally a thermo-electric make and break element which I preferably, though not necessarily, house within a suitable simple casing. Said element 10 comprises a base 11 of insulation material which is preferably in the form of a flat plate or strip and upon which the various parts of the device are secured. These parts consist of a thermo element 12, comprising preferably a bimetallic metal strip 13, such as is commonly used in such devices, and an insulated wire wound in a coil 14 upon same for heating the strip.

The strip 13 extends longitudinally of the base 11 and is secured at one end 15 to the base near one end of same, preferably by a hollow rivet 16. The end 15 of the strip is formed down so as to separate the body of the strip from the base in order that it may have freedom to swing from and toward the base as it is affected by the heating of the coil 14.

On the opposite side of the base and at the opposite end I secure a connecting plate 17, preferably by means of a hollow rivet 18, and I form the plate so that its inner end 19 stands free of the base. For connecting the contact plate 17 to the thermo strip 13 I provide an adjustable contact screw 20, providing aligned threaded openings in the contact strip 17 and the base for same. The separation of the body of the strip from the base allows the same to be bent toward or away from the base to cause the screw 20 to be frictionally held, even though the two threaded openings each receive the screw freely. Preferably for durability I provide

the point of the screw and the thermo strip with suitable lasting contact points 21 and 22, respectively.

As so far described, the device may be complete as an article of commerce to be used without a casing or to be completed by any suitable protective covering.

The circuit wires 23 and 24, as best shown in Figure 1, can be connected, one to the fixed end 15 of thermo element 13 by soldering to the hollow rivet, and the other 24 similarly connected to the hollow rivet 18 and connecting plate 17.

In connecting the coil 12 in shunt, one end of the coil is connected, as by soldering, to the free end of the thermo strip 13, as by soldering, as shown at 25, and the other end 26 is carried through a hole 27 in the base 11 and is similarly connected to the connecting plate 17, as shown at 28.

When the device is free of current the contacts 21 and 22 stand normally open, and when the device is placed in circuit the current will flow in by the wire 23 through the thermo element 13 to and through the heating coil 12 and to the contact plate 17 and so to the other circuit wire 24. The resistance of the coil 12 is enough so that not enough current can flow for lighting or other purposes, but enough to heat the thermo strip and deflect it to close the contacts 21 and 22. When this occurs the coil is short circuited, the current flowing directly through the contact screw 20 from the thermo element to the contact plate 17. This short circuiting of the coil allows the thermo element to cool and swing away from the base, thus opening the circuit at the contacts 20—21 and again causing the coil to heat the thermo element. By means of the adjusting screw 20 the periodicity of the operation can be adjusted. Instead of permanently connecting the circuit wires 23 and 24, as described, I may and sometimes do provide binding screws 29 and 30, securing the wires 23 and 24 to the thermo strip and to the connecting plate 17, respectively.

I preferably protect the device so far described by means of a simple tubular casing 31. This casing may be made of the cheapest material, such as paper, fibre or thin sheet metal, but I preferably make it of some insulation material, such as paper or fibre. When the tubular casing is made of an insulation material I extend the body of the adjusting screw 20 out through a suitable hole 32, so that the screw will dowel the casing on the make and break element 10, and I preferably provide the screw with an insulation head 33 to avoid all danger of shock.

The tubular casing may comprise simply a piece of straight tubing, as shown in Figure 1, and I close the ends of the casing and hold the element 10 rigidly therein by means of bushings 34 of insulation material. These bushings are provided with nozzles 35 for entering the ends of the tube and may have threaded connection therewith or be otherwise secured in position. They are also formed with outer flanges or heads 36 which contact with the ends of the tube. The bushings are provided as usual with central openings 37 through which the circuit wires can enter the casing. The inner ends of the nozzles 35 of the bushings 34 contact with the ends of the base 11 and hold the same against endwise movement in the casing. The base 11, as shown in Figure 3, fits tightly, transversely in the tubular casing and is thus held therein.

It should now be understood that I have reduced the device to the simplest and cheapest parts or elements. The casing can be cut from long lengths and the base can be cut from strips.

One feature of my device is the provision of an extension cord in combination with a make and break device as an article of commerce. When so prepared or made up, I prefer to permanently connect the circuit wires 23 and 24, as described, and to carry the other wire 38 of a flexible cord, of which the circuit wires 23 and 24 are a part, through the casing, as shown in full lines, Figure 1. I also provide in such an extension cord a suitable connecting plug 39 at one end and a suitable connecting socket 40 at the other end.

The form and manner of connection shown in Figure 1 in full lines I prefer to use when making up the extensions as new devices, but when it is desired to connect in a make and break device in a cord which has its ends connected to various devices, I prefer to use the form of device illustrated in Figure 4ª, cutting one of the wires of the cord and connecting it in by means of the binding screws 29 and 30 and carrying the other wire of the cord around the device, as indicated in dotted lines in Figure 1. I have made this explanation for the purpose of showing that my device is capable of being easily and readily applied to various situations.

In Figure 5 I have illustrated another simple form of casing. In this form the casing is preferably made of sheet metal in the form of a tubular shell formed closed at one end 42. The opposite end may be closed by a screw cap 43 and the end wall of the cap carries a suitable insulating bushing 44 provided with a central opening 45 through which the circuit wires enter the casing. In this form the screw cap 43 binds the base 11 in place. I sometimes provide an adjustable contact screw 46 for the device which does not extend through the casing and the casing is provided with an opening 47 through which access can be had to the

screw for adjusting same. In this case I provide other means for holding the thermo device in proper registry with opening 47, such as a pressed in groove 48 in the bottom 42 of the casing for receiving the adjacent end of the base 11.

I sometimes provide an adjusting screw 49 which extends out through the metal casing and when I do this I provide the screw with a head of insulation material which has an elongated body part 50 which fits freely in the opening 47 in the casing and extends through same to prevent contact of the screw with the casing.

In Figures 7 and 8, I have illustrated the thermo device as series wound instead of shunt wound. In this manner of use the circuit wire 23 instead of being connected to the base of the thermo strip is connected directly to one end of the coil 12, as shown at 51. The other wire as before is connected to the contact plate 17, as shown at 52, and the opposite end of the coil 12 is connected to the free end of the thermo strip 13, as shown at 53. In this arrangement the contacts 21 and 22 are normally closed, for if they were open no current could flow at all. The contacts being closed, when the device is placed in circuit, the current flows from wire 23 through the heating coil 12, through contacts 21—22, the screw 46, the contact plate 17 to the wire 24. By this means the thermo strip 13 is heated and swings away from the contact screw 46 and opens the circuit, thus stopping the flow of current and allowing the thermo strip to cool down and swing back into contact with the screw 46.

As many modifications of my invention will suggest themselves to one skilled in the art, I do not limit or confine my invention to the specific constructions herein shown and described, except within the scope of the appended claims.

I claim:

1. A self contained make and break device, comprising an elongated unitary, flat base of insulation material, a bi-metallic strip secured at one end to one end of the base and extending longitudinally of same, the free end spaced from the base, a heating wire wound in a coil around said strip and electrically connected at one end to said strip, a circuit wire electrically connected to the thermo element at its fixed end, a metallic connection strip secured to the opposite side of the base opposite to the free end of the thermo element, an adjustable contact screw carried by the free end of the contact strip and extending through the base and adapted to contact at its point with the free end of the thermo element, the opposite end of the heating wire connected to said contact strip, and a circuit wire secured in electrical connection with the contact strip, as and for the purpose specified.

2. In a device of the kind described, a thermo make and break device, including an elongated base for same, an elongated casing in which the device is housed, the casing, including a tubular member within which the base fits and heads closing the ends of the tubular member, the heads and the wall of the casing holding the base in position in the tubular member, as and for the purpose specified.

3. In a device of the kind described, a tubular casing, a base plate held centrally within the casing by the walls thereof, a thermo-electric make and break mechanism carried by the plate, a closure for the casing for holding the plate in the casing, and said closure having an opening through which a current carrying member can pass.

4. In a device of the kind described, a tubular casing, a flat plate-like base of insulation material fitting diametrically within the casing and freely removable therefrom, a thermo-electric make and break mechanism carried by the base, said make and break mechanism including an adjustable contact screw, the casing provided with an opening adapted to register with the screw, and means for retaining the base within the casing with the screw head in registry with said opening.

5. In a device of the kind described, a tubular casing, a thermo-electric make and break device fitting transversely in the casing, the device held against longitudinal movement in the casing by the ends thereof, and means for retaining the device against rotational movement in the casing, as and for the purpose specified.

6. In a device of the kind described, a casing, a make and break device within the casing and fitting transversely therein, the body of the make and break device being thin enough to provide a free or open space at each side thereof into which the metallic parts of the make and break device project, the device held in position longitudinally by the heads of the casing, the device, including an adjustable contact screw, the casing wall provided with an opening and means for retaining the device with the opening in registry with said screw, as and for the purpose specified.

7. In a device of the kind described, a casing formed closed at one end and open at the other, a removable cover for the open end, an insulation bushing for the cover, a thermo-electric make and break device in the casing and held against longitudinal movement therein by the cover, the bushing having an opening for the circuit wires.

8. In a device of the kind described, a tubular casing, a make and break device in

the casing, means for closing the ends of the casing, said closure means serving to hold the make and break device against movement in the casing and with open spaces on opposite sides thereof, as and for the purpose specified.

9. In a device of the kind described, a base of insulation material, a thermo-electric bar secured at one end only on one side of the base, a contact plate secured to the opposite side of the base and having an end portion spaced from the base and arranged opposite to the free end of said bar, registering threaded openings in the base and the outstanding portion of the contact strip for receiving an adjustable contact screw, as and for the purpose specified.

In testimony whereof, I have hereunto set my hand, this 24th day of February, 1925.

JAMES W. PHELPS.