May 26, 1931. H. E. BUTLER 1,807,381

CUT-OUT FOR SERIES INCANDESCENT STREET LIGHTING CIRCUITS AND THE LIKE

Filed April 24, 1929

Fig. 1.

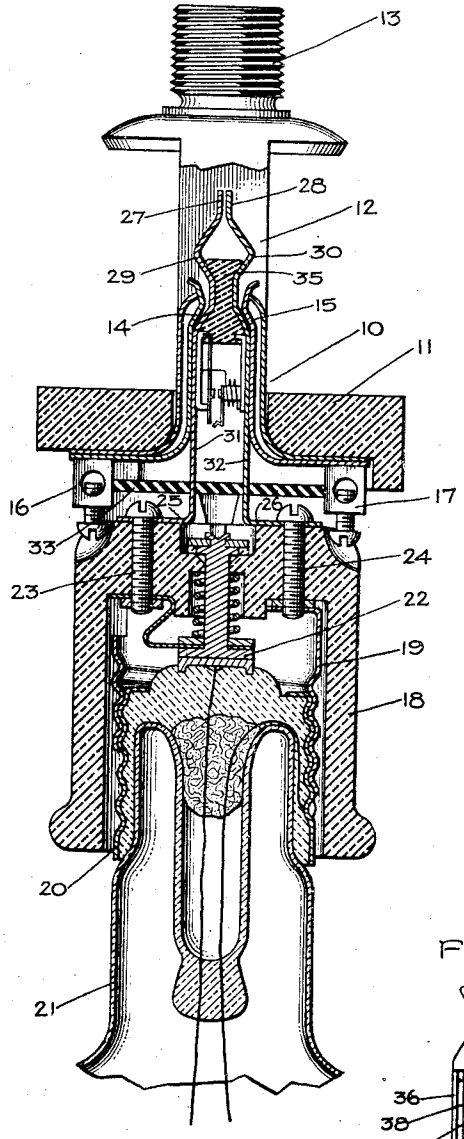


Fig. 2.

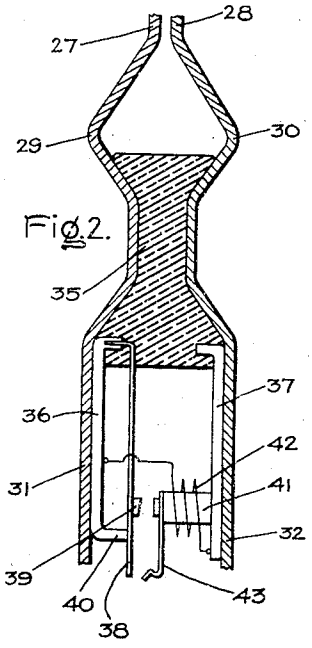


Fig. 3.

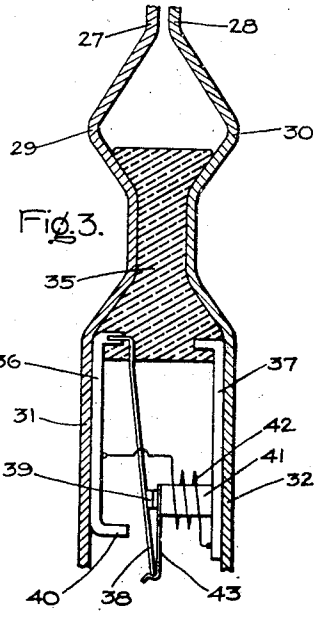
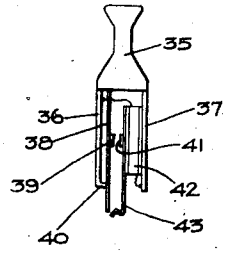


Fig. 4.



Inventor:
Henry E. Butler,
by Charles E. Mullen
His Attorney.

Patented May 26, 1931 1,807,381

UNITED STATES PATENT OFFICE

HENRY E. BUTLER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

CUT-OUT FOR SERIES INCANDESCENT STREET-LIGHTING CIRCUITS AND THE LIKE

Application filed April 24, 1929. Serial No. 357,834.

The present invention relates to cutouts for electric circuits such as are used in connection with series incandescent street-lighting whereby in case the circuit becomes interrupted at any one of the lamps in series, the cutout serves automatically to provide a new or shunt circuit about the point of interruption. This serves to permit current to pass through the other or unruptured lamps in the series so that the breaking down of one or more of a number of lamps in series will not interfere with the proper functioning of the remaining lamps.

More recently there has come into use what are termed low voltage series street-lighting circuits, and in connection with such circuits, difficulty has been experienced with known types of cutouts in providing a uniform product which would function at the lower operating voltage. At the present time, failure of a cutout to function, while it is objectionable because of extinguishing all the lights in the series circuit, has now become increasingly objectionable because of radio interference.

The object of my invention is to provide an improved cutout which can be used in standard series street-lighting sockets and which is thoroughly reliable in operation on either high voltage or low voltage circuits.

For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

In the drawings, Figure 1 is a sectional view of a series street-lighting socket provided with a cutout embodying my invention; Figures 2 and 3 are detail sectional views illustrating the operation of the cutout, and Fig. 4 is a side view of the cutout.

Referring to the drawings, 10 indicates a receptacle having a base 11 and a bracket 12 provided with a threaded end 13 adapted to be connected to a lamp post bracket. Carried by base 11 are two opposed spring contacts 14 and 15 to which are connected binding posts 16 and 17 which receive the series line terminals. 18 indicates a lamp socket having a threaded shell 19 adapted to receive the threaded end 20 of an incandescent lamp 21. Shell 19 forms one terminal connection for the lamp, the other terminal connection being formed by a central contact 22. Contact 22 and shell 19 are connected by screws 23 and 24 to spring contacts 25 and 26 which are adapted to be inserted between spring contacts 14 and 15 to form the circuit connections for connecting the lamp into the series circuit and also to form a supporting means for the lamp socket. Spring contacts 25 and 26 have parallel, outer ends, as indicated at 27 and 28 below which are bowed-out portions 29 and 30. Below bowed-out portions 29 and 30 the contacts have long, straight substantially parallel portions 31 and 32. 33 is an insulating plate which surrounds contacts 25 and 26 at their lower ends. The construction so far described is that of a standard series street-lighting lamp socket and is the construction in connection with which my invention is particularly intended for use, although the invention is not limited necessarily to use with this specific type of socket structure.

In using the usual types of cutouts, termed usually, "film" or "disk" cutouts with series sockets of the type illustrated, the cutout is located between the flat ends 27 and 28 of spring contacts 25 and 26, thus serving to open the shunt circuit around the lamp filament. In case the lamp burns out, the cutout is ruptured due to increased voltage applied to it, whereupon a shunt path around the burned-out lamp is established.

According to my invention, I provide a means for permanently holding the contacts 27 and 28 spaced apart and I then provide an electro-magnetic means for establishing electrical connection between the spring contacts 25 and 26 in case the lamp in the socket burns

out, the electro-magnetic means being operated by the increased voltage applied to it caused by the burning out of the lamp.

In the embodiment of the invention illustrated in the drawings, 35 indicates an insulating member located between spring contacts 25 and 26 and serving to separate permanently the contact ends 27 and 28. Carried by insulating member 35 are metal bars 36 and 37 which when the cutout is positioned between spring contacts 25 and 26, are in electrical contact with spring contacts 25 and 26 respectively. Metal bar 36 is a permanent magnet. Connected to bar 36 is a spring contact arm 38 formed of magnetic material and provided with a projection 39 which forms an armature for an electromagnet. The free end of spring contact arm 38 is arranged adjacent to the pole 40 of permanent magnet 36 and normally is held in engagement therewith as is shown in Figs. 1, 2 and 4. Connected to bar 37 is the core 41 of an electro-magnet, the outer end of the core being located adjacent to armature 39. On core 41 is winding 42 which at one end is connected to bar 36 and at the other end to bar 37. Carried by core 41 is a catch 43 which is adapted to engage spring arm 38 and hold it in the position shown in Figs. 3 whenever the spring arm is moved by the electromagnet.

In operation the cutout, which is a unitary structure in itself as shown in Fig. 4, is inserted between the spring contacts 25 and 26 as is shown in Figs. 1 to 3, the spring arm 38 being in engagement with stop 40 as is shown in Fig. 2, and being held there magnetically. The insulating member 35 holds ends 27 and 28 separated. The resistance of the winding of electromagnet 42 is so high compared to the resistance of the lamp filament that but a very small current passes through it, practically all of the current passing through the lamp filament. Under these circumstances, the electromagnet is not sufficiently energized to attract armature 39 against the action of the permanent magnet on spring arm 38 so that the parts will remain in the Fig. 2 position. The lamp burns in the usual manner. In case the filament of the lamp is ruptured, the increased current which flows through the winding of the electromagnet will energize it sufficiently to pull armature 39 against the end of core 41, as shown in Fig. 3, the end of arm 38 engaging with the catch 43. When the armature 39 engages the end of core 41 and arm 38 engages catch 43 there is established a shunt path around the ruptured filament by way of spring contact 25, bar 36, arm 38, armature 39 and/or catch 43, core 41, bar 37, and spring contact 26. There is formed also a shunt circuit around the winding 42, but this does not permit spring arm 38 to move back to its former position because it is now held by the catch 43. When the lamp is renewed, it is necessary merely to remove the socket 18, insert a new lamp, separate the arm 38 from engagement with catch 43 so that it returns to its Figure 2 position, and then replace socket 18.

By my invention, it will be seen that I provide a cutout which is magnetically-operated whereby it can be constructed to operate accurately at any desired voltage, it being only necessary to properly proportion the winding 42 for the operating voltage desired. At the same time the device is simple in structure and can be used in connection with a standard series socket.

In accordance with the provisions of the patent statutes, I have described the principles of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. The combination with a lamp socket having lamp terminal connections and a pair of contact arms electrically connected to said terminals, of a cutout structure held between said contact arms comprising an insulating means for holding said arms from electrical contact with each other, an electro-magnet having the terminals of its windings connected to said arms, and a conductor which is moved by the electromagnet to connect electrically said contact arms.

2. The combination with a lamp socket having lamp terminal connections and a pair of contact arms electrically connected to said terminals, of a cutout structure held between said contact arms comprising insulating means for holding said arms from electrical contact with each other, an electro-magnet having the terminals of its windings connected to said arms, a conductor which is moved by the electromagnet to connect electrically said contact arms, and means independent of the electro-magnet for holding the conductor in the position to which it is moved by the electromagnet.

3. A cutout for use with a lamp socket having a pair of contact arms for bridging the socket terminals, comprising an insulating means for separating said contact arms, contact members for engaging the arms, one of said contact members being a permanent magnet, an electromagnet having its terminals connected to said contact members, and a conductor normally held by said permanent magnet and adapted to be moved by said electromagnet to bridge the contact members.

4. A unitary cutout structure for use with a lamp socket having a pair of contact arms for bridging the socket terminals, comprising

a pair of spaced contact bars insulated from each other and adapted to fit between the contact arms and hold them separated, an electromagnet carried by one of said arms, a spring strip carried by and electrically connected to one of said arms, and means whereby when the electromagnet is energized, the spring strip is moved to electrically connect said arms.

In witness whereof, I have hereunto set my hand this 23rd day of April, 1929.

HENRY E. BUTLER.