

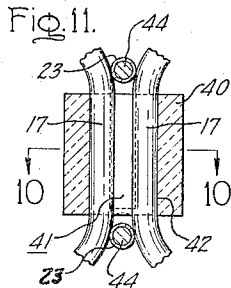
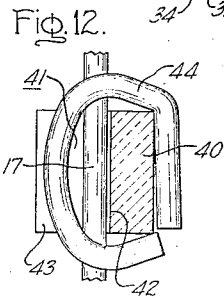
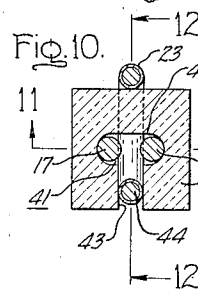
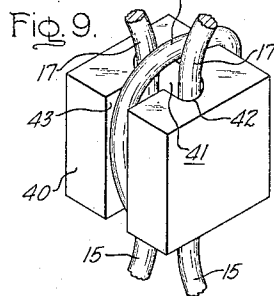
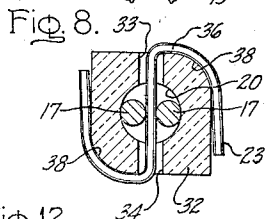
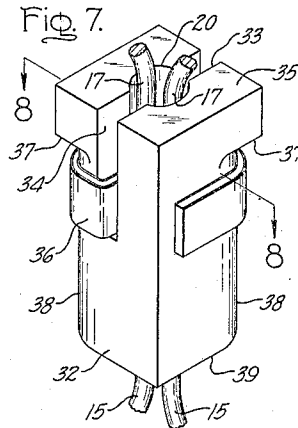
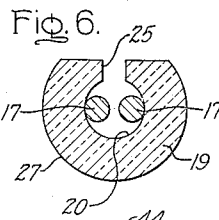
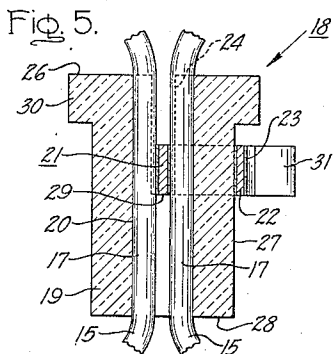
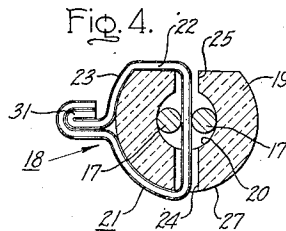
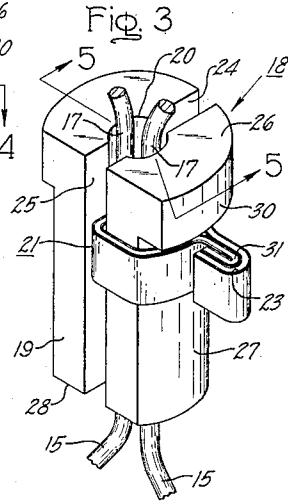
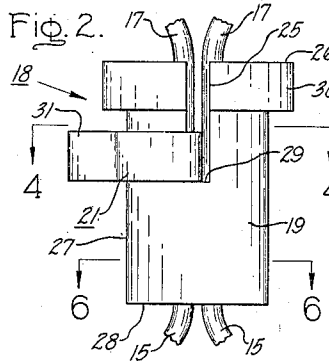
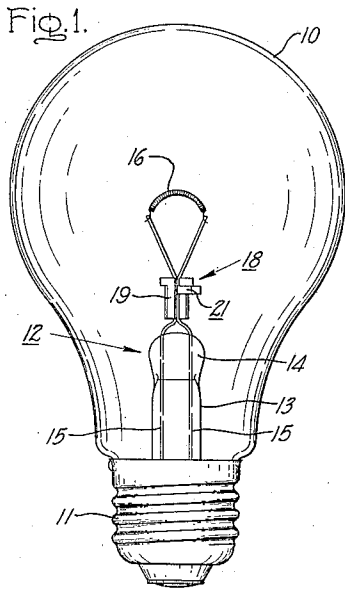
Jan. 23, 1945.

I. H. VAN HORN

2,367,905

CUT-OUT FOR ELECTRIC LAMPS

Filed May 24, 1943



Inventor:
Irving H. Van Horn,
by *John H. Anderson*
His Attorney.

UNITED STATES PATENT OFFICE

2,367,905

CUTOUT FOR ELECTRIC LAMPS

Irving H. Van Horn, East Cleveland, Ohio, assignor to General Electric Company, a corporation of New York

Application May 24, 1943, Serial No. 488,198

6 Claims. (Cl. 315—75)

My invention relates in general to series electric incandescent lamps and other similar electrical devices comprising a filament or other electric energy translation element mounted in a glass enclosure such as a bulb. More particularly, my invention relates to cutouts for such series lamps and devices which operate to preserve the electrical circuit through the lamp or devices, upon failure of the filament or other element thereof, so that the other devices in the series circuit will continue to operate.

One form of cutout construction heretofore employed in series lamps consists of a metal clip bridging the inner leads of the lamp and provided with an oxidized aluminum liner or other film cutout in one end thereof which serves to insulate the metal clip from one of the lamp lead-in wires. With such a cutout construction, if the filament fails while hot (i. e., during operation of the lamp), an arc forms between one end of the broken filament and one of the lead-in wires which wire then melts back in the form of a ball until the heat caused by the arc rises high enough to break down the insulating film of the cutout, thereby forming an electrical connection between the two lead-in wires. Occasionally, however, such a cutout fails to function if the arc melts back the lead-in wire on that side of the metal clip without the oxidized aluminum liner or other film cutout, with the result that the arc may continue down into the stem press and socket, resulting in extinguishment of the circuit and possibly a damaged socket.

One object of my invention is to provide an effective cutout for an electric lamp or similar device which will effectively operate to preserve the electrical circuit through the lamp regardless of which lead-in wire is melted back by the arc which usually forms when the lamp filament fails during operation.

Another object of my invention is to provide a film-type cutout construction for an electric lamp or similar device which can be assembled in place without any mechanical pinching of that portion of the film cut-out element which engages the lead-in wires whereby scratching of or injury to the oxide insulation on the film cutout element, with consequent premature breakdown of the cutout, is effectively avoided.

Still another object of my invention is to provide an effective cutout for electric lamps and similar devices which may be conveniently attached in place.

A feature of the invention is the use of a small block of insulating material for holding portions of the lamp lead-in wires in closely spaced relation and for supporting a film cutout element in place in contact with the said closely spaced portions of the lead-in wires. A further

feature of the invention is a cutout construction of the above type in which the film cutout element extends through a cross-slot in the insulator block and has its free ends bent around the insulator block and securely fastened together whereby straightening-out or warping of the cutout element under the influence of the repeated heating and cooling cycles to which it is subjected during lamp service, with consequent danger of the cutout element dropping out of the insulator block so as to render the cutout inoperative, is positively avoided.

Further objects and advantages of my invention will appear from the following description of species thereof and from the accompanying drawing in which:

Fig. 1 is an elevation of an electric incandescent lamp provided with a cutout structure according to my invention; Fig. 2 is a rear elevation on an enlarged scale of the cutout structure of the lamp shown in Fig. 1; Fig. 3 is a perspective view of the cutout structure shown in Figs. 1 and 2; Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 2; Fig. 5 is a vertical section on the line 5—5 of Fig. 3; Fig. 6 is a horizontal section on the line 6—6 of Fig. 2; Fig. 7 is a perspective view of a modified form of cutout structure comprising my invention; Fig. 8 is a horizontal section on the line 8—8 of the cutout shown in Fig. 7; Fig. 9 is a perspective view of another modified form of cutout structure comprising my invention; Fig. 10 is a horizontal section through the cutout shown in Fig. 9; and Figs. 11 and 12 are vertical sections taken on the lines 11—11 and 12—12, respectively, of Fig. 10.

Referring to Fig. 1, the electric incandescent lamp there shown comprises a glass bulb 10 having a base 11 secured thereto and a mount structure 12 sealed therein. The said mount structure comprises a re-entrant glass stem 13 having a press portion 14, a pair of lead-in wires 15, 15 sealed in the press portion 14 of the stem and connected to the terminals of the base 11, and an electric energy translation element or filament 16 connected to the inner ends of the lead-in wires 15. The lead-in wires 15 are formed with juxtaposed inner portions 17, 17 which extend closely adjacent and parallel to one another, as shown in Fig. 5.

Mounted on the lead-in wires 15, at the closely spaced portions 17 thereof, is a cutout structure 18 according to the invention. The said cutout structure comprises a hollow support block 19 of suitable refractory insulating material, such as porcelain, lava, glass, alsimag or silamanite, and of generally cylindrical shape with a central bore or passageway 20 extending longitudinally therethrough. The insulator block 19 fits over the closely spaced portions 17 of the lead-in

wires 15 with the said wire portions 17 extending through the central bore 20 in the insulator block.

Extending between the closely spaced wire portions 17 and carried by the insulator block 19 is a film cutout element 21 such as an aluminum wire or ribbon 22 (preferably the latter) coated with a thin film of aluminum oxide 23. This oxide coating 23 may be formed by electrical deposition or by other well-known methods and is of such character as to serve as an insulator at and somewhat above the normal operating voltage of the individual lamp but which will break down at a voltage appreciably above the individual lamp operating voltage, such as the full line voltage across the series circuit for instance. The cutout element 21 is disposed within a cross-slot formed in the insulator block 19 by aligned slot portions 24, 25 communicating with the hollow interior 20 of the insulator block. The cross-slot 24, 25 preferably extends to the upper end 26 of the insulator block 19 so as to permit easy insertion of the cutout element 21 in place between the lead-in wire portions 17 and in the cross-slot after the insulator block has been mounted in place on the lead-in wires. To prevent the cutout element 21 from slipping laterally through and out of the cross-slot 24, 25, the end portions of the element outwardly of the cross-slot 24, 25 are bent or wrapped more or less tightly around the exterior surface 27 of the insulator block 19, as shown in Fig. 4. The central bore 20 in the insulator block 19 is a little greater in diameter than the sum of the two diameters of the closely spaced lead-in wire portions 17 so that the said wire portions 17 can be separated and insulated from one another by the cutout element 21.

As shown in Fig. 2, the cross-slot portion 24 at one side of the central bore 20 terminates short of the lower end 28 of the insulator block 19, the bottom 29 of the said cross-slot portion 24 thus serving as a stop for preventing the cutout element 21 from dropping down out of the insulator block and out of its operative position between the closely spaced portions 17 of the lead-in wires. The cross-slot portion 25 at the other side of the central bore 20 preferably extends the full length of the insulator block 19 so as to form, together with the central bore, a keyhole slot (as shown in Fig. 6) for permitting the insulator block 19 to be laterally slipped over and readily mounted in place on the closely spaced portions 17 of the lead-in wires 15 after the said wires have been formed to their final shape.

To lock the cutout element 21 in place in the cross-slot 24, 25 against upward removal therefrom, the insulator block 19 is provided with a ridge 30 extending around the exterior cylindrical surface 27 of the insulator block at the upper end thereof. The exposed end portions of the cutout element 21, being bent tightly around the exterior surface 27 of the insulator block 19, therefore underlie the ridge 30. The said ridge thus serves as a locking lug or stop to limit the upward movement of the cutout element 21 in the cross-slot 24, 25 and so prevent upward removal of such element from the said cross-slot and from its operative position between the closely spaced portions 17 of the lead-in wires 15.

During service of the lamp, the cutout element 21 is subjected to repeated heating cycles occasioned by the turning on and off of the lamp. If the exposed end portions of the cut-

out element 21 outwardly of the cross-slot 24, 25 were otherwise free to move or bend laterally of the insulator block, such repeated heating cycles would tend to straighten out or warp the said exposed end portions of the cutout element with the result that the said end portions of the cutout element would move away from their position under the locking ridge or lug 30 and eventually slide or fall out of the cross-slot 24, 25 so as to render the cutout wholly inoperative. To prevent such distortion of the cutout element 21 as would permit it to become displaced from its operative position within the cross-slot 24, 25 and between the wire portions 17, I have found it advisable to securely fasten together the free ends of the cutout element as by clinching, whereby the said element is positively locked in place on the insulator block. As shown in Figs. 3 and 4, this is preferably accomplished by bending the opposite exposed end portions of the cutout element 21 around the exterior 27 of the insulator block into side-by-side interengagement and then bending the contiguous extreme end portions of the cutout element back upon themselves to form a double overlap interconnection, as indicated at 31.

In the modification shown in Figs. 7 and 8, an insulator support block 32, similar to the block 19 in Figs. 1-6 but of generally rectangular or square cross-section, is mounted on and surrounds the closely spaced or juxtaposed portions 17 of the lead-in wires 15, the said block 32 being provided with a central longitudinally-extending bore 20 through which the said closely spaced wire portions 17 extend. As in the previous form of the invention, the insulator block 32 is provided with a cross-slot 33, 34 extending part way down into the block from the upper end 35 thereof and communicating with the central bore 20, and a film cutout element 36, similar to the cutout element 21 in Figs. 1-6, is disposed within the said cross-slots 33, 34 so as to extend between and engage the closely spaced portions 17 of the lead-in wires 15. The cutout element 36 is locked in place in the cross-slots 33, 34 by bending the exposed end portions of the element more or less tightly around the exterior surface of the block so as to underlie locking lugs or lips 37 formed on the block, adjacent the upper end 35 thereof, by rounding or beveling portions of the corners 38 of the block around which the cutout element is bent. If desired, one or the other of the cross-slot portions 33, 34 may extend down to the lower end 39 of the block, like the cross-slot 25 in Figs. 1-6, to thereby permit mounting of the block 32 in place on the juxtaposed wire portions 17 after the lead-in wires 15 have been formed to their final shape.

In the modification shown in Figs. 9-11, a hollow insulator support block 40 having a keyhole slot 41 therein formed by a central passageway 42 and a cross-slot 43, is mounted on and surrounds the closely spaced portions 17 of the lead-in wires 15, the said wire portions 17 extending longitudinally through the central passageway 42. Disposed within the cross-slot 43 and extending between and in contact with the juxtaposed portions 17 of the lead-in wires 15 is a film type cut-out element 44 of wire-like form, such as an aluminum wire having a coating of aluminum oxide thereon. The wire cutout element 44 is bent more or less tightly around the exterior of the insulator block 40 in the form of a loop, as shown in Fig. 12, to thereby securely

fasten it in place in the insulator block. The maximum dimension of the central passageway 42 is made a little less than the sum of the diameters of the juxtaposed lead-in wire portions 17 and the wire cutout element 44 so that the said wire element is more or less wedged between the juxtaposed wire portions 17 to thereby insure positive contact with both of the lead-in wires 15.

Inasmuch as the various cutout elements according to the invention are fastened in place on the insulator support blocks without any mechanical pinching of that portion of the cutout element within the cross-slot in the block and between the lead-in wire portions 17, there is consequently no danger of the oxide coating or insulation on the cutout element being scratched or otherwise injured, during assembly of the cutout device, such as might cause a premature breakdown of the cut-out.

In operation, the cutout will not function as long as the filament 16 remains intact inasmuch as the oxide film on the cutout element acts as an insulator at the normal operating voltage of the lamp. However, if the filament 16 fails when the lamp is not in operation, the cutout element then operates when the circuit switch is subsequently closed. The full voltage of the line being then impressed across the film cutout element, the oxide film on the cutout element is punctured and a conductive path or short circuit thus provided between the lead-in wires 15, 15. This allows the other lamps of the series to light up and at the same time shows up the defective lamp.

Should the filament 16 fail during operation of the lamp, an arc forms between the broken filament and one or the other of the lamp lead-in wires 15. This arc then melts the said lead-in wire back in the form of a molten ball or globule until either the said molten globule contacts the other lead-in wire to thereby form a short circuit across the lead-in wires, or until the oxide insulating film on the cutout element is electrically broken down by the heat of the arc so as to form a conductive path between the two lead-in wires 15. In the latter case, inasmuch as the film cutout element is in engagement with both of the lamp lead-in wires 15, it will therefore operate to short-circuit the said lead-in wires regardless of which lead-in wire is melted back by the arc that forms upon failure of the lamp filament during operation.

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

1. In an incandescent lamp comprising a bulb having lead-in wires extending thereinto and a filament electrically connected to said wires, a hollow insulator block surrounding portions of said wires and holding them in close proximity, the wires being spaced in said block by the thickness of a film cutout element which extends between said wires and is fastened to said block to maintain both the block and cutout element itself in place on said lead-in wires.

2. In an incandescent lamp comprising a bulb having lead-in wires extending thereinto and a filament electrically connected to said wires, a hollow insulator block surrounding portions of said wires and holding them in close proximity, the wires being spaced in said block by the thick-

ness of a film cutout element which extends between said wires and is wrapped securely around said block.

3. An electric incandescent lamp comprising a bulb, a filament disposed within said bulb, lead-in wires extending into said bulb and electrically connected to said filament, said lead-in wires having closely spaced portions, a hollow insulator block mounted on and enclosing the closely spaced portions of said lead-in wires and provided with a cross-slot communicating with the hollow interior of said insulator block, and a film cutout element disposed within the said cross-slot and in contact with the closely spaced portions of said lead-in wires, said cutout element being carried by and securely fastened to said insulator block.

4. An electric incandescent lamp comprising a bulb, a filament disposed within said bulb, lead-in wires extending into said bulb and electrically connected to said filament, said lead-in wires having closely spaced portions, a hollow insulator block mounted on and enclosing the closely spaced portions of said lead-in wires and provided with a cross-slot communicating with the hollow interior of said insulator block, a film cutout element disposed within the said cross-slot and extending between and in contact with the closely spaced portions of said lead-in wires, said cutout element being carried by and securely fastened to said insulator block and said insulator block having stop means cooperating with said cutout element to lock said element in place within the cross-slot in said insulator block.

5. An electric incandescent lamp comprising a bulb, a filament disposed within said bulb, lead-in wires extending into said bulb and electrically connected to said filament, said lead-in wires having closely spaced portions, an insulator block mounted on said lead-in wires adjacent the closely spaced portions thereof and having a cross-slot therethrough, and a film cutout element disposed within the said cross-slot and in contact with the closely spaced portions of said lead-in wires, said insulator block having stop means co-operating with said cutout element to lock said element in place within the cross-slot, and said cutout element having its opposite ends bent around the exterior of said insulator block and securely fastened together to maintain said cutout element in co-operative relation to said stop means.

6. An electric incandescent lamp comprising a bulb, a filament disposed within said bulb, lead-in wires extending into said bulb and electrically connected to said filament, said lead-in wires having closely spaced portions, a hollow insulator block mounted on and enclosing the closely spaced portions of said lead-in wires and having a cross-slot therethrough communicating with the hollow interior of said insulator block, and a film cutout element disposed in said cross-slot and extending between and in contact with the closely spaced portions of said lead-in wires, said insulator block having stop means co-operating with said cutout element to lock said element in place within said cross-slot and said cutout element having its opposite ends bent around the exterior of said insulator block and securely clinched together.

IRVING H. VAN HORN.