March 28, 1950 B. C. DILLON 2,501,996

FUSE PLUG

Original Filed June 20, 1945

Fig. 1

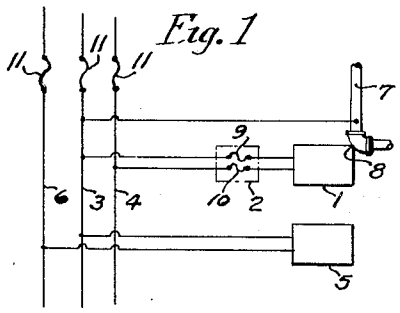


Fig. 2

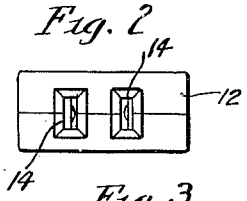


Fig. 3

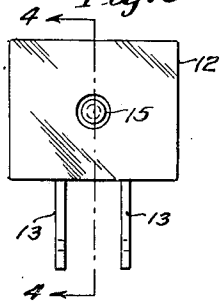


Fig. 4

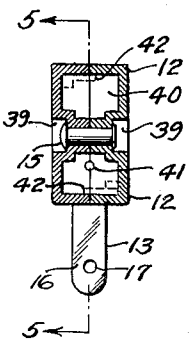


Fig. 5

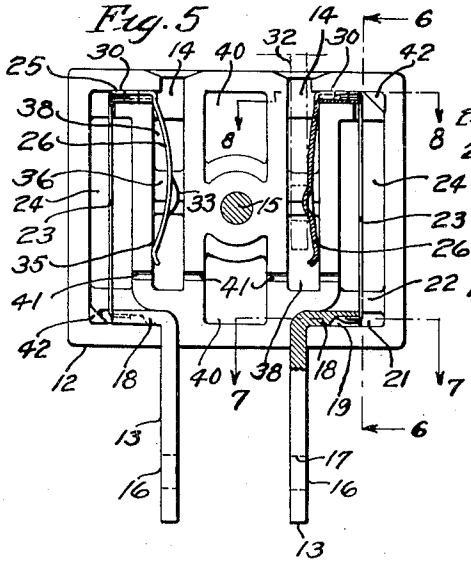


Fig. 6

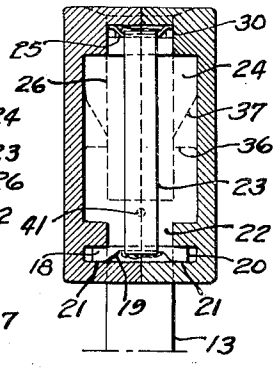


Fig. 7

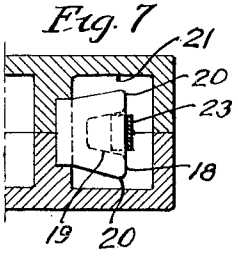


Fig. 8

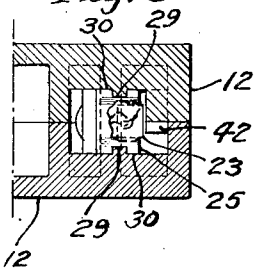
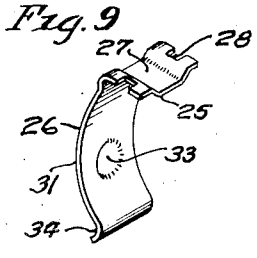


Fig. 9



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UNITED STATES PATENT OFFICE

2,501,996

FUSE PLUG

Bernard Charles Dillon, New Haven, Conn.

Substituted for application Serial No. 600,520, filed June 20, 1945. This application filed January 17, 1947, Serial No. 722,568

2 Claims. (Cl. 200—115.5)

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This invention relates to electrical fuse plugs and more particularly to fuse plugs for household lighting fixtures and appliances as disclosed in my abandoned prior application, Serial Number 600,520, filed June 20, 1945 and for which this application is a substitute.

It is well known that inconvenience and confusion occur if a fuse blows in a main electrical current supply line. The lights all go out and one must find his way in the darkness or under match or candle light to the fuse box to renew the fuse.

In the earlier non-polarized lighting systems still in use but with modern portable appliances, there is danger of fire being started from short-circuits in spite of the ordinary fuse protection.

It is the object of my invention to prevent such inconvenience, confusion and danger of fire when a short-circuit blows a fuse. This is accomplished by providing an individual fuse plug for each lighting fixture or appliance so that only the shorted appliance will be put out of action. Every appliance or fixture may be provided with a fuse of proper amperage to suit its current consumption and thus lessen the danger from overheated shorted wires.

It is a further object of my invention to provide an individual fuse plug of such compact size as will fit the present standard multiple receptacle and narrow plug.

Another object of this invention is to provide a fuse plug which will withstand the ordinary connecting and disconnecting with a receptacle and plug without affecting the delicate fuse wire.

These objects and other advantageous ends will be described hereinafter with the accompanying drawing in which:

Figure 1 is a wiring diagram of a circuit illustrating the function of my invention when a short circuit occurs,

Figure 2 a top view of a fuse plug made in accordance with my invention,

Figure 3 a front view of Figure 2,

Figure 4 a section taken on line 4—4 of Figure 3,

Figure 5 an enlarged section taken on line 5—5 of Figure 4,

Figure 6 a section taken on line 6—6 of Figure 5,

Figure 7 a fragmentary section taken on line 7—7 of Figure 5,

Figure 8 a fragmentary section taken on line 8—8 of Figure 5, and

Figure 9 a perspective view of a contact forming a part of my invention.

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Referring to Figure 1 of the drawing, 1 indicates an appliance shown diagrammatically and electrically connected through by fuse plug 2 to a neutral or ground line 3 and a live line 4. A second appliance diagrammatically shown at 5 is electrically connected to ground line 3 and the second live line 6 of a 3 phase current supply as would occur in a non-polarized lighting system.

A ground pipe illustrated at 7 is electrically connected to the ground line 3 and shown in contact with appliance 1 at 8. Should a short circuit occur in appliance 1, the ground side fuse 9 would usually blow. Should the shorted wires become grounded through the appliance to the pipe 7, the live side fuse 10 would blow. Thus fuse protection is provided against shorted appliance accidentally grounded by using a fuse in both sides of a circuit.

When an appliance is plugged into a circuit which is not polarized such as shown at 5, and the fuse plug 2 is not used in the circuit of appliance 1, one of the main line fuses 11 would blow when a short occurred. Usually the ground line fuse would blow first. In a non-polarized circuit the current would then travel between lines 4 and 6 through appliances 1 and 5 at increased voltage, overloading the entire system and causing damage. With a fuse plug 2 connected to each appliance, such overloading of the circuit would be prevented.

The fuse plug is made in the form of a case 12 having a pair of prongs 13 at one end and a pair of receptacle openings 14 at the other end to receive the prongs of a standard plug.

The case is made in halves identical in shape which fit each other and the electrical parts they enclose so as to anchor and securely hold them in place.

The halves may be secured to each other by a rivet 15 or other equivalent means such as an eyelet or screw.

Each prong 13 has a contacting end 16 with a hole 17 therein and an anchoring end 18 bent at right angles. A recess 19 in anchoring end 18 is formed by upsetting the metal and spreading the side edges to form wings 20. This anchoring end 18 of each prong fits snugly in a nest 21 in each half of the case. Each nest is shaped to suit economical manufacturing methods and is shown as following the general contour of the anchoring end excepting for the space 22 through which a fuse wire 23 passes. By having wings 20 securely held in the nests as shown in Figures 5 and 6, the prongs will withstand sidewise

as well as endwise strains without shifting and distorting the fuse wire.

Each fuse wire 23 is soldered in recess 19 in prong anchoring end 18 and passes through a chamber 24 to a contact anchoring end 25 of a contact 26 where it is soldered in a recess 27 formed from the anchoring end as shown in Figure 9. A pair of locking notches 28 in the opposite edges of each contact anchoring end 25 fit bridges 29 in contact nests 30 in each half of the case. Each nest follows the general contour of the overall thickness of the anchoring end and has the bridges 29 therein.

Each contact is shaped, as shown in Figure 9, to provide a bowed portion 31 for engaging the prongs of a standard plug as indicated in dot and dash lines at 32. This portion 31 is normally disposed in a plane at right angles to the plane of anchoring end 25 and has a hump 33 formed therein to keep the plug prongs in place in the usual manner. The free end 34 of the bowed portion is curved outward so that a smooth sliding surface rides on the wall 35 of opening 14 when the bowed portion is compressed.

Nesting the anchoring end 25 in the manner described prevents it from shifting and distorting the fuse wire by the sidewise and endwise strains of connecting and disconnecting a standard plug.

It will be noted that by having the anchoring ends of the contacts and the prongs pointing outwardly, enables spacing the fuse wires 23 a sufficient electrical distance from the proximity of the standard plug prongs and within an insulating chamber, without increasing the overall thickness of the case beyond the size of a standard plug.

The receptacle openings 14 have prong guides 36 to guide the prongs of a standard plug into contacting position. They also serve to prevent sidewise shifting of the standard plug prongs and the contacts. One side 37 of the guides is inclined to slide the end of a plug prong into proper position. Providing guiding means such as guides 36 only where needed enables hollowing out the remaining portion 38 of openings 14 for economical manufacturing.

The hole for rivet 15 is enlarged at 39 for the rivet head and its upset end. The walls around the hole merge into the walls of openings 14. Cavities 40 in the center of the case half lighten the case and also facilitate uniform curing the plastic material from which the case may be made.

Communicating passages 41 in the four walls between fuse chambers 24 permit escape of air when either or both fuses 23 blow. The passages 41 permit escape of gases into cavities 40 and contact openings 38 whereby the cubic capacity of fuse chambers 24 will be increased thus serving to prevent exploding the case when an unusually good sealing fit is made by the case halves around chambers 24.

The contact openings 14 when in use are substantially sealed by contacts 26, the prongs on the plug, and the guides 36.

When only one fuse blows, the pressure is further released without damage to casing by connection straight through into the other fuse chamber.

To insure proper matching of the nests, chambers, openings and cavities of one case half with the other when they are assembled and thereby further insure lining up the prongs and contacts, I provide a dowel lug 42 at diagonally opposite

corners of each case half. When the case halves are assembled, the dowel lugs of one case half will fit the open corners of the other case half. Thus one case half is properly lined up with the other case half and both halves are locked to each other at their four corners against turning around the rivet 15. By having the nests 21 and 30 properly aligned, the prongs 13 and contacts 26 fitting these nests will also be correctly aligned. Displacement of the case halves by abnormal strains on a prong 13 is thus prevented by the locking fit of dowels 42.

To assemble the fuse plug 2, first a prong 13 and contact 26 is held in a suitable fixture in the same relation as they would be held in their nests 21 and 30 respectively. Then a fuse wire 23 is placed on the prong and contact and the fuse ends bent into the recesses and soldered therein. Two such assemblies of the prongs, contacts and fuses are then placed in one half of the case. The other case half is placed over the prongs and contacts and brought against the first case half with dowels 42 fitting the open corners. The case halves are then secured to each other by rivet 15. The fuse plug is now ready for use.

It is thus seen that by arranging the prongs and contacts with their contacting sides parallel to each other in the direction of the thickness of the case, it was possible to make a case half having nests parallel to each other in the direction of their depth. Thus providing a case half which may be easily moulded from plastic material and readily slipped over the contacts and prongs to securely hold them in assembled position.

In use the fuse plug is connected to a fixture or appliance by inserting its standard plug prongs into opening 14. During this action bowed portion 31 of each contact will be compressed by the plug prong and hump 33 will snap into the prong opening. The fuse plug is then inserted into a standard receptacle in the same manner as a standard plug is inserted. The appliance or fixture is now ready for use with fuse protection as described above.

Should the appliance wiring become shorted, the ground side fuse 9 as indicated in Figure 1 would ordinarily blow. If the appliance happened to be in contact with a grounded object like a water pipe, radiator or bath tub, and the shorted wire was accidentally grounded to the appliance, then the other live wire fuse 10 would blow, thus affording full fuse protection to both sides of an electric supply line at each appliance.

It will be noted that by making the prongs and contacts with their anchoring ends bent outwardly from the center of the fuse plug, sufficient space is provided in the case for the fuse wire, without increasing the thickness of the case beyond the size of a standard plug, thus enabling the fuse plug to be used in the present closely spaced multiple receptacles.

It should also be noted that a maximum fuse length may be obtained in a minimum case length with an arrangement of prongs and contacts having anchoring ends nested at an angle to their electrical contacting ends.

While I have set forth my invention in a particular form, it will be understood that its shape may be changed without affecting the function thereof, and hence I do not limit myself to the precise construction set forth, but consider it my liberty to make such changes and alterations as

fairly come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A fuse plug comprising a casing having a pair of parallel openings substantially the full depth of the case, a pair of fuse wire chambers at the outer side of said openings and of substantially the same length as said openings, said openings and said chambers being substantially in alignment crosswise of said casing, a contact nest communicating with the outer end of each opening and one end of the adjacent chamber, each nest having bridges therein, a prong nest communicating with the other end of each chamber and extending inwardly toward, then outwardly in line with, the parallel openings; a pair of prongs having anchoring ends fitting securely one in each of the prong nests, each anchoring end being wider than the prong and having a recess in said wide portion; a pair of contacts one in each of the openings each being formed to provide a recess in its anchoring end and a pair of locking notches at each side of the recess fitting said bridges in the contact nests to prevent shifting; and a fuse wire in each chamber soldered to the contact and prong recesses, said contact and prong ends with the fuse wire soldered thereto substantially filling the respective nests to seal them to prevent escape of heated gas and fuse material from the chambers.

2. A fused attachment plug, comprising a rectangular casing of insulating material having identically formed opposing side portions and being greater in width than in length, and greater in length than in thickness when the inner surfaces of the opposing side portions are in abutting relation, said casing portions having relatively thin top and bottom walls, front and rear walls, and side walls, means to tightly secure the casing portions together, each of said side portions having a central wall extending lengthwise, from the front wall to substantially the rear wall, a contact opening in each of the side portions along each side of the central wall, a crosswise wall spaced forwardly from the rear wall to close the inner end of each contact opening, and an opening through the front wall connecting with each contact opening, a fuse member chamber alongside of each top and bottom wall and extending lengthwise of the casing portion from the front wall to the rear wall and parallel to the adjacent lengthwise contact opening, a lengthwise wall between each chamber and the adjacent contact

opening, said crosswise wall extending between the rear end of said lengthwise wall and said central wall, each chamber extending from the front end of the adjacent lengthwise opening to beyond the wall at the closed inner end of each contact opening and from the inner surface of the side portion laterally to the adjacent side wall thereof, prong openings through the rear wall, one on each side of the central wall, a first passageway between the rear wall and the wall at the closed end of each lengthwise contact opening to connect the prong opening with the adjacent chamber at its rear end, a second passageway extending alongside the front wall to connect each of the lengthwise contact openings with the front end of the adjacent chamber, all of the passageways being disposed at right angles to the lengthwise contact openings and the fuse members chambers, a metallic prong disposed in each prong opening and having a blade portion extending from the casing beyond the rear wall thereof, said prong having a terminal end portion bent at right angles to the blade portion, disposed in the first passageway to substantially the lengthwise center of the chamber, a metallic contact member disposed in each contact opening and having an end portion bent at right angles thereto and disposed in the second passageway, said contact member end portion extending into the front end of the adjacent chamber alongside the casing front wall to substantially the lengthwise center of the chamber, and with its outer end substantially in lengthwise alignment with the outer end of the prong end portion, and a length of fusible material in each chamber extending between and electrically connected to the prong end and the contact end in each chamber, said length of fusible material being substantially parallel to the meeting surfaces of the casing portions intermediate the side walls of said portions.

BERNARD CHARLES DILLON.

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