June 16, 1936. D. S. RIVERS ET AL 2,044,449

RESET FUSE PLUG

Filed March 11, 1935

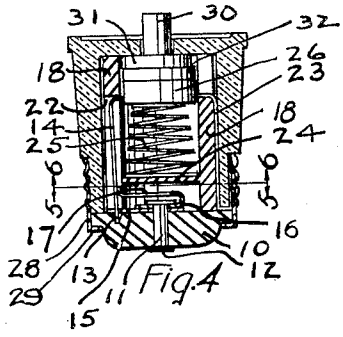


Fig.4

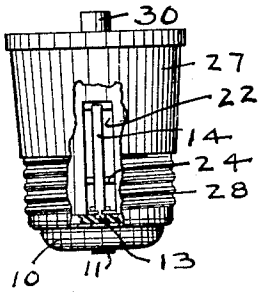


Fig.1

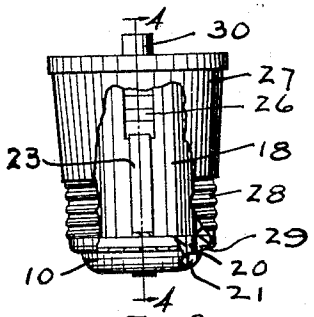


Fig.2

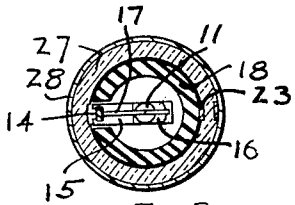


Fig.5

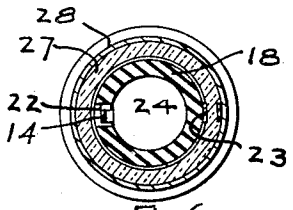


Fig.6

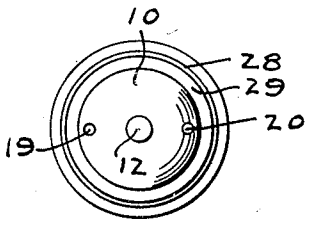


Fig3

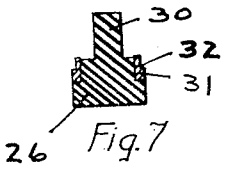


Fig.7

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RESET FUSE PLUG

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8 Claims. (Cl. 200—116)

This invention relates to the art of fuse plugs and has for one of its primary objects the provision of a structure permitting resetting or re-establishing of the circuit through the plug following an interruption of the circuit due to an overload so that regardless of the number of circuit interruptions, the circuit may again be re-established without having to replace any fuse element.

A further important object of our invention is to provide a structure which will be positive in operation so that the circuit will be interrupted at the desired overload without danger of failure of the circuit to open. A still further important object is to provide a structure which may be readily manufactured and easily assembled at a minimum cost and which will provide for a uniform load carrying rating such that the device may be manufactured in quantity and still have the desired degree of circuit interruption at the fixed maximum load.

These and other objects and advantages such as the novel combination of the various elements as set forth in the claims will become apparent to those versed in the art in the following description of the invention as illustrated by the accompanying drawing, in which

Fig. 1 is a side elevation of a structure embodying our invention;

Fig. 2, an elevation of the reverse side;

Fig. 3, a bottom plan view;

Fig. 4, a vertical transverse section on the line 4—4 in Fig. 2;

Fig. 5, a horizontal transverse section on the line 5—5 in Fig. 4;

Fig. 6, a horizontal transverse section on the line 6—6 in Fig. 4, and

Fig. 7, a central vertical section through the operating plunger.

Like characters of reference indicate like parts throughout the several views in the drawing.

We form a base 10 to have a central stud 11 terminating on the under side of the base by a contact head 12. On the upper side of the base is a recess in the nature of a slot into which is loosely fitted the foot 13 of a rocker bar 14. In the form herein shown, a piece of insulating material 15 is placed on the base 10 to straddle the bar 14 above the foot 13 so as to rockably retain that foot in the base recess. On top of the material 15 is placed a terminal plate 16 of a wire 17. The plate 16 and material 15 fit over the upper end of the stud 11 which is spun or riveted over onto the plate 16 to compressively draw the plate down against the material 15 and the base 10.

The wire 17 is then bent around and over the upper end of the stud 11 and carried across substantially horizontally to have its end brought into contact with the bar 14 and there welded or soldered to form a good electrical contact. This wire 17 is made out of some suitable wire which has a high degree of expansion when heated by flow of a current therethrough so that with the correct diameter and length of wire will cause a longitudinal expansion of that wire 17 so as to rock the bar 14 outwardly a slight distance which is in reality measured in terms of thousandths of an inch.

We form a cylindrical member, hereinafter termed a tube 18 and connect it to the base 10 by two prongs 19 and 20 which are frictionally inserted and engaged in holes 21 extending vertically through the base 10. The lower end of the tube 18 is pushed downwardly into contact with the upper side of the base 10. A slot 22 is provided in one side of the tube 18 within which the bar 14 enters so as to permit the free rocking thereof. On the opposite side of the tube 18 is provided a vertical recess along which is placed a conductor 23, here shown as being in the nature of a flat strap. The upper end of the tube 18 is slotted immediately above this recess to permit the upper end of the strap 23 to be turned inwardly to enter through the slot into the tube 18. The upper end of this strap 23 thus turned inwardly is at the same level as that of the upper end of the bar 14 which is also provided with an inturned end.

The lower end of the strap 23 is turned outwardly along the base 10 and thence upwardly to form a U-bend. The tube 18 is further provided with a transverse partition or floor 24 spaced a short distance above the wire 17. A spring 25 is placed within the tube 18 to rest on this floor 24 and a plunger 26 is dropped into the tube 18 to have its under side rest on the upper end of the spring 25.

A body 27 is provided to fit down over the tube 18 by a more or less cylindrical portion, the outer lower end of which is threaded to receive a ferrule 28 therearound. This ferrule 28 is formed with an inturned annular flange 29 which engages the under side of the base 10 so that when the ferrule is drawn up on the body 27, the base and body 27 are drawn snugly together. The outer upturned end of the strap 23 is carried in a slight depression cutting across through the threads of the body 27, but is maintained in fric-

tional engagement with the ferrule to form an electrical connection therewith. Preferably the upper edge of the ferrule **28** is pushed inwardly into the upper end of the recess within which the outer end of the strap **23** rests so as to prevent unwarranted turning of the ferrule on the body **27**. The upper end of the tube **18** preferably engages against the inside upper end of the body **27**. A hole is provided in the upper end of the body **27** through which a shaft **30** may slidably extend from the plunger **26**. When the body **27** is drawn down into contact with the base **10** by the ferrule **28**, the plunger **26** is pulled downwardly to compress the spring **25** thereunder somewhat.

The plunger **26**, Fig. 7, is made of some suitable insulating material and has a metallic band **31** therearound located at the upper end thereof. This band **31** has the upper portion thereof relieved slightly to form a shoulder **32** of very slight proportion. In fact it is preferred that the recess be not more than a few thousandths of an inch deep. The shoulder may even be slightly rounded.

In the position as shown in Fig. 4, the fuse is in the open circuit setting. Now by pushing downwardly on the shaft **30**, the plunger **26** is pushed downwardly also until the shoulder **32** is carried down sufficiently to permit the inturned ends of the bar **14** and of the strap **23** to slip over the top of the shoulder whereupon pressure on the shaft **30** may be released so that these ends thus engaging over the shoulder on the plunger will retain the plunger in that lowered position against the upward push of the spring **25**. It is to be noted that the normal position of both the bar **14** and of the inturned end of the strap **23** is such as to be in yielding contact with the plunger **26** so that both of the inturned ends of those members will spring inwardly when permitted. The plunger **26** fits sufficiently loose within the tube **18** as to permit the ends of these two members to spring over the shoulder on the plunger.

Now when the fuse plug is inserted in the usual panel (not shown) and current is allowed to flow through the fuse following a circuit established through the stud **11**, wire **17**, bar **14**, band **31**, strap **23**, and the ferrule **28**. When the flow of this current exceeds the amount for which the wire **17** has been designed as to length and diameter, there will then be a sufficient longitudinal expansion of that wire due to the heat of that predetermined current flow which will cause the bar **14** to be pushed outwardly thereby releasing its inturned end from over the shoulder on the plunger **26**. Since the plunger is loosely carried within the tube **18**, it will move over to the left under the constant pressure of spring **25** sufficiently to permit its shoulder in slight relief to escape from engagement with the inturned end of the strap **23** whereupon the spring **25** will immediately kick the plunger **26** upwardly and thereby carry the band **31** out of engagement with both the bar and strap **23** and thereby interrupt the circuit since the ends of the bar and strap will then be contacting the plunger, if at all, on the insulated portion. The fuse may be reset by simply pushing inwardly again on the shaft **30** as above described. A further safety feature in the fuse is to be found in the fact that the size and material of the wire **17** are so selected that should for any reason the bar **14** not be pushed out of contact with the band **31**, continual flow of that overload current will cause the wire to melt and thereby break the circuit.

While we have herein shown and described our invention in the best form as now known to us, it is obvious that structural changes may be made without departing from the spirit of the invention, and we, therefore, do not desire to be limited to that precise form beyond the limitations as may be imposed by the following claims.

We claim:

1. The combination of a base, a central stud carried by the base, an expansible member electrically connected to the stud, a rocker bar shifted by expansion of said member, a body, a ferrule interconnecting the body and the base, a conductor leading from the ferrule and having an inturned end, an end turned inwardly from said bar opposite said conductor end, a plunger loosely fitted to have lateral play and having a metal member thereon, spring means urging the plunger away from said ends, and a shoulder on the metal member on said plunger engaging said ends to permit them to contact said metal member and releasably hold said plunger against the urging of said spring, whereby shifting of said bar by said expansible member will cause it to move from and release said plunger.

2. The combination of a base, a central stud carried by the base, an expansible member electrically connected to the stud, a rocker bar shifted by expansion of said member, a body, a ferrule interconnecting the body and the base, a conductor leading from the ferrule and having an inturned end, an end turned inwardly from said bar opposite said conductor end, a plunger loosely fitted to have lateral play and having a metal member thereon, spring means urging the plunger away from said ends, and a shoulder on the metal member on said plunger engaging said ends to permit them to contact said metal member and releasably hold said plunger against the urging of said spring, whereby shifting of said bar by said expansible member will cause it to move from and release said plunger, a tube carried between said base and body, said spring being within the tube, and said plunger being slidably carried in the tube.

3. The combination of a base, a central stud carried by the base, an expansible member electrically connected to the stud, a rocker bar shifted by expansion of said member, a body, a ferrule interconnecting the body and the base, a conductor leading from the ferrule and having an inturned end, an end turned inwardly from said bar opposite said conductor end, a plunger loosely fitted to have lateral play and having a metal member thereon, spring means urging the plunger away from said ends, and a shoulder on the metal member on said plunger engaging said ends to permit them to contact said metal member and releasably hold said plunger against the urging of said spring, whereby shifting of said bar by said expansible member will cause it to move from and release said plunger, said inturned ends entering said tube through apertures therein to be in the path of the plunger.

4. The combination of a base, a central stud carried by the base, an expansible member electrically connected to the stud, a rocker bar shifted by expansion of said member, a body, a ferrule interconnecting the body and the base, a conductor leading from the ferrule and having an inturned end, an end turned inwardly from said bar opposite said conductor end, a plunger loosely fitted to have lateral play and having a metal member thereon, spring means urging the plunger away from said ends, and a shoulder on the

metal member on said plunger engaging said ends to permit them to contact said metal member and releasably hold said plunger against the urging of said spring, whereby shifting of said bar by said expansible member will cause it to move from and release said plunger, said inturned ends entering said tube through apertures therein to be in the path of the plunger, and said metal member forming a band around the plunger.

5. The combination of a base, a central stud carried by the base, an expansible member electrically connected to the stud, a rocker bar shifted by expansion of said member, a body, a ferrule interconnecting the body and the base, a conductor leading from the ferrule and having an inturned end, an end turned inwardly from said bar opposite said conductor end, a plunger loosely fitted to have lateral play and having a metal member thereon, spring means urging the plunger away from said ends, and a shoulder on said plunger engaging said ends to permit them to contact said metal member and releasably hold said plunger against the urging of said spring, whereby shifting of said bar by said expansible member will cause it to move from and release said plunger, said inturned ends entering said tube through apertures therein to be in the path of the plunger, and said metal member forming a band around the plunger, and said shoulder being formed in slight relief on said band.

6. A resetting plug fuse comprising a base, a central conducting stud through the base, an upwardly extending rocker bar, means rockably retaining the bar on the base, a current overload expanding member interconnecting said stud and said bar, an enclosing body, a ferrule fitting over said base and screw-threadedly engaging the body, a conductor engaging the ferrule and extending therefrom in an upwardly direction to have an upper inturned end, an inturned end on said bar opposite said other end, a plunger loosely fitted to have lateral play and having a metallic portion adapted to be passed between said ends to contact therewith, means guiding said plunger toward and away from those ends, spring means normally urging said portion out of contact with said ends, and a shoulder in slight relief on the metal member on the plunger adapted to be engaged by said ends to retain said portion in contact therewith.

7. A resetting plug fuse comprising a base, a central conducting stud through the base, an upwardly extending rocker bar, means rockably retaining the bar on the base, a current overload expanding member interconnecting said stud and said bar, an enclosing body, a ferrule fitting over said base and screw-threadedly engaging the body, a conductor engaging the ferrule and extending therefrom in an upwardly direction to have an upper inturned end, an inturned end on said bar opposite said other end, a plunger having a metallic portion adapted to be passed between said ends to contact therewith, means guiding said plunger toward and away from those ends, spring means normally urging said portion out of contact with said ends, and a shoulder on the metal member on the plunger adapted to be engaged by said ends to retain said portion in contact therewith, said guiding means comprising a tube into which said ends project, said plunger being loosely fitted in the tube to permit slight lateral movement for disengagement of the shoulder from said conductor end upon movement thereaway of said bar end.

8. A resetting plug fuse comprising a base, a central conducting stud through the base, an upwardly extending rocker bar, means rockably retaining the bar on the base, a current overload expanding member interconnecting said stud and said bar, an enclosing body, a ferrule fitting over said base and screw-threadedly engaging the body, a conductor engaging the ferrule and extending therefrom in an upwardly direction to have an upper inturned end, an inturned end on said bar opposite said other end, a plunger having a metallic portion adapted to be passed between said ends to contact therewith, means guiding said plunger toward and away from those ends, spring means normally urging said portion out of contact with said ends, and a shoulder on the metal member on the plunger adapted to be engaged by said ends to retain said portion in contact therewith, said guiding means comprising a tube into which said ends project, said plunger being loosely fitted in the tube to permit slight lateral movement for disengagement of the shoulder from said conductor end upon movement thereaway of said bar end, a partition in said tube, said spring means comprising a compression spring within the tube and bearing between said partition and said plunger.

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