May 24, 1938. B. R. HERMANN 2,118,646

ELECTRIC CIRCUIT INTERRUPTING DEVICE

Filed Dec. 19, 1936

Fig. 1.

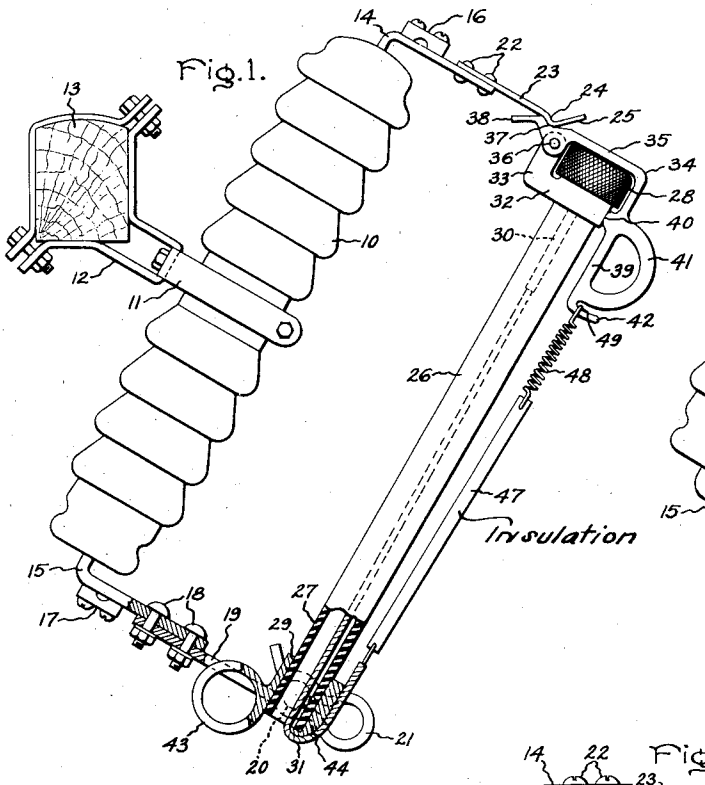


Fig. 2.

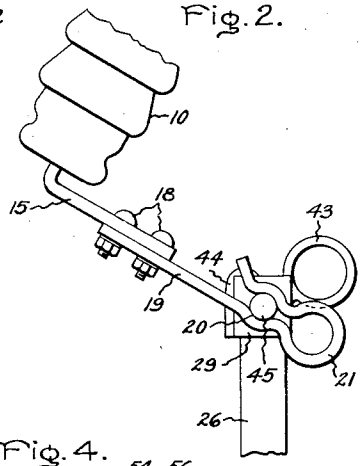


Fig. 3.

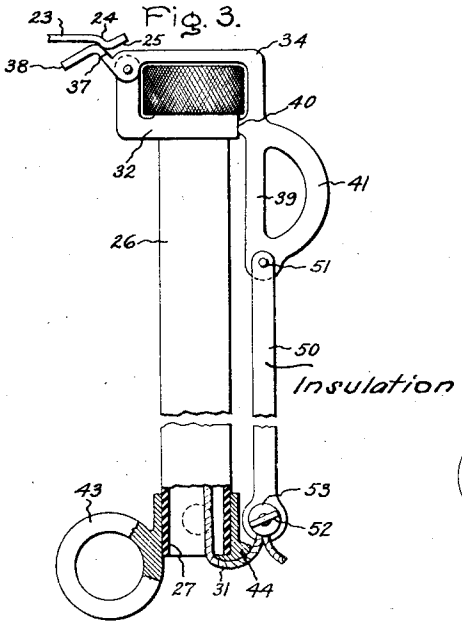
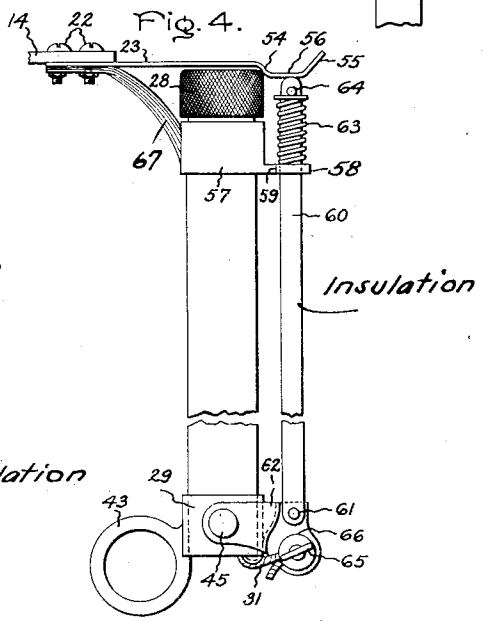


Fig. 4.



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ELECTRIC CIRCUIT INTERRUPTING DEVICE

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12 Claims. (Cl. 200—116)

The present invention relates to electric circuit interrupting devices and has for a general object the provision of improvements in the construction and arrangement of electric fuse cutouts, particularly of the drop-out type.

One of the specific objects of the invention is the provision of improved latching and latch releasing means for a drop-out fuse cutout.

Further objects and the manner of carrying out the invention will become apparent from the following detailed description taken in conjunction with the accompanying drawing in which Fig. 1 shows a side view of a fuse cutout embodying the present invention with the cutout in closed circuit position, Fig. 2 is a partial view of the cutout of Fig. 1 with the fuse holder thereof in open circuit position, and Figs. 3 and 4 illustrate two modified forms of cutout embodying the present invention.

Referring particularly to Fig. 1, 10 designates an insulator which may be mounted in any suitable manner as for example by means of a strap 11 and clamping device 12 on a cross arm 13. It is preferable for reasons which will become apparent that the insulator be mounted at an angle to the horizontal as shown in Fig. 1.

Two contact supports 14 and 15 are cemented or otherwise suitably secured to the top and bottom respectively of the insulator and are provided with terminal clamping plates 16 and 17 to provide for the attachment of electric line leads thereto.

Fastened to the lower contact support 15 by means of bolts 18 is a contact clip 19 which is constructed of a relatively resilient wire or strip of metal bent into substantially U-shape to provide two outwardly projecting substantially parallel and spaced apart prongs. The outer ends of these prongs are bent upwardly and backwardly and so formed as to provide curved pivot seats 20 as best shown in Fig. 2. The prongs are formed with outer loop portions 21 so as to provide adequate resiliency for frictionally holding pivot pins in the pivot seats 20, and the ends of the prongs are flared outwardly with respect to the main body of the contact clip 19 so as to guide the pivot pins into the pivot seats 20. On the upper contact support 14 there is fastened, by means of bolts 22, a contact 23 also formed of a relatively resilient wire or strip of metal and having a downwardly bent portion 24 to serve as a latch detent and an upwardly bent portion 25 to serve as a guide in a manner which will become apparent hereinafter.

Connected between stationary contacts 19 and 24 and supported thereby is a fuse holder generally designated 26 comprising a fuse tube 27 of pressed fibre or other suitable insulation material closed at the upper end by means of a knurled cap 28 and open at the lower end, which last is provided with a surrounding metal ferrule 29. Cap 28 is threaded onto the upper end of the fuse tube 27 and serves in a well known manner to anchor the upper end of a fuse link 30 which is illustrated for example as being of the commonly employed universal cable type having its lower end or cable extension 31 projecting from the lower open end of the fuse tube as shown in Fig. 1.

Also secured to the upper end of fuse tube 27 is a metal ferrule or collar 32 which has an upwardly projecting arm 33 upon the upper end of which is pivotally mounted an L-shaped latching lever 34. If desired, cap 28 may be formed integrally with collar 32 or may be threaded thereon instead of directly onto the upper end of fuse tube 27. One leg 35 of the L-shaped lever 34 is adapted normally to extend across the end of the fuse holder transversely of the longitudinal axis thereof and the pivot point 36 for the lever 34 is located intermediate the ends of this leg 35. Toward the outer or free end of leg 35 is provided an upwardly bent portion, as indicated at 37, to provide a latching seat for engagement with the latching portion or detent 24 of contact 23, while the outermost end of the leg 35 is bent downwardly as indicated at 38 to provide a guide for cooperation with the guide 25 on contact 23 to facilitate the movement of detent 24 into engagement with latching seat 37. The other leg 39 of the L-shaped lever 34 is adapted to extend in substantially parallel side by side relation with the upper end of fuse tube 27 when the leg 35 extends transversely with respect to the longitudinal axis of the fuse tube. On the inner surface of leg 39 is formed a projection 40 arranged to repose normally in abutting engagement with the side of collar 32, and a ring-shaped portion 41 is provided on the outer surface of leg 39 to provide for engagement of a switch hook therewith. At the outermost end of leg 39 is provided a hook portion 42 for a purpose to be described hereinafter.

Lower ferrule 29 has on one side a ring 43 adapted to be engaged by a switch hook and has on the other side a grooved projection or foot 44 for receiving the outwardly projecting portion of cable extension 31. When cable extension 31 is drawn into contact with grooved foot 44 there is provided a path for current flow from contact

19 through ferrule 29 and the cable extension to the fuse link. Intermediate the ring 43 and grooved foot 44 the ferrule is provided with trunnions 45 which are adapted to be received in the pivot seats 20 of the two projecting arms of contact clip 19 for pivotally supporting fuse holder 26. To the outer end of cable extension 31 is secured one end of a link 47 comprised of a strip or rod of insulation material and to the other end of link 47 is fastened a spring 48 having on its free end a hook 49 adapted to be fastened over the hook shaped portion 42 of L-shaped lever 34.

In the assembly of fuse holder 26, fuse link 30 is dropped into fuse tube 27 and the upper end of the fuse link is securely anchored in place by means of cap 28. The fuse link and its cable extension 31 are then drawn relatively taut so that the cable extension is in firm engagement with grooved foot 44 and the hook 49 of spring 48 is fastened over the hook 42. Thus leg 39 of lever 34 is secured in parallel relationship with the fuse tube with projection 40 held firmly in abutting engagement with collar 32. The fuse holder, hung upside down on a switch hook which engages ring 43, is then lifted into place so that trunnions 45 rest on contact clip 19, whereupon the trunnions may readily be pulled into engagement with the pivot seats 20. The switch hook is then placed in ring 41 and the fuse holder swung upwardly and latched in connected position by engagement of detent 24 with latching seat 37, the guides 25 and 38 cooperating to facilitate the movement of the detent into engagement with the latching seat. Contact 23, due to its resilience, tends to rotate lever 34 in a counter-clockwise direction, as viewed in Fig. 1, to effect disengagement of latching seat 37 from detent 24, but such counter-clockwise rotation of lever 34 is prevented due to the force of spring 48 which more than balances the spring pressure exerted by contact 23. The cutout may be operated manually as a disconnect switch by means of a switch hook in engagement with ring 41.

With the cutout in the connected position illustrated in Fig. 1, excessive overload or short circuit current causes operation or rupture of fuse link 30 which results in release of the tension on cable extension 31 and thereby release of spring 48. Lever 34 no longer being held rigidly in position with its projection 40 in engagement with ferrule 32, resilient contact 23 effects rotation of lever 34 in a counter-clockwise direction so that latching seat 37 moves downwardly and becomes disengaged from detent 24 to release the upper end of the fuse holder from the upper stationary contact. The fuse holder being tilted at an angle to the vertical, thereupon swings downwardly under the influence of gravity to the drop-out position, partially illustrated in Fig. 2, thus completely removing the fuse holder from between the stationary contacts. The expulsion recoil of the fuse holder, initially produced upon operation of the fuse, is to a large extent absorbed by the resilient lower supporting contact 19 so that insulator 10 is not subjected to damaging shock. Furthermore, the releasing action of the latching mechanism is sufficiently slow to afford ample time for extinction of any arc within fuse tube 27 before complete disengagement of upper contact 23 from the latching lever 34 and, since the upper end of fuse tube 27 is closed by means of cap 28, no hot, ionized gases are blown out the top of the fuse tube to cause flashovers on overhead lines. A further advantage of the construction is that due to the firm frictional engagement of pivot seats 20 of contact clip 19 with trunnions 45, excessive overswing of the fuse holder is prevented.

The fuse cutout of Fig. 3 is substantially the same in construction and arrangement as that of Fig. 1 except that the linkage element for connecting latching lever 34 with cable extension 31 is in the form of a rod 50 of insulation material which has one end pivotally connected as indicated at 51 to the lower end of the parallel extending leg 39 of the latching lever so that the linkage rod becomes a permanent fixture on the latching lever. On the other or lower end of rod 50 is a clamping screw 52 and washer 53 assembly providing for the attachment of the outwardly projecting end of cable extension 31 to the lower end of the rod. In the assembly of the fuse holder for installation, the fuse link is inserted through the fuse tube 27 in the manner previously described and is then drawn sufficiently taut over grooved foot 44 to insure good electrical contact. When the cable extension is attached to the lower end of rod 50, the fuse link exerts a downward pull on rod 50 to draw leg 39 of lever 34 into substantially parallel side by side relation with the fuse tube so that projection 40 on leg 39 is held in firm engagement with ferrule 32. The fuse holder is then ready for installation in the manner previously described so that the lower end of the fuse holder is pivotally mounted on lower contact 19 and detent 24 of upper contact 23 is in engagement with the latching seat 37 on latching lever 34 as shown in Figs. 1 and 3.

With the fuse holder of Fig. 3 in the connected position illustrated, rupture of the fuse link releases the tension on cable extension 31 freeing rod 50 and permitting lever 34 to be rotated in a counter-clockwise direction as viewed in Fig. 3, so that latching seat 37 becomes disengaged from detent 24 and allows the fuse holder to swing outwardly and downwardly as previously described.

In the embodiment of the invention illustrated in Fig. 4, fuse holder 26 is adapted to be pivotally mounted on lower contact clip 19 in the same manner as that described in connection with the two previous embodiments. However, in this case upper contact 23 is provided with a detent portion 54 arranged to engage cap 28 on the upper end of the fuse holder for maintaining the fuse holder in connected position. At the outer end of contact 23 is provided an upwardly turned guide portion 55 for leading the contact cap into engagement with the detent portion 54, and intermediate the turned up portion 55 and the detent portion 54 is a substantially straight horizontal portion 56.

Around the upper end of the fuse holder and in electrical conductive relation with cap 28 and the upper end of a fuse link within the fuse holder, there is mounted a metallic collar 57 having an outwardly projecting arm 58. This collar may be formed, if desired, integrally with cap 28 or as a ferrule upon which cap 28 is threaded. Arm 58 has an opening 59 for slidably accommodating the upper end of a rod 60 of insulation material. The lower end of rod 60 is pivotally attached by means of a pin 61 to a substantially U-shaped bracket 62 which is pivotally supported on the trunnions 45 carried by lower ferrule 29. Surrounding the upper end of rod 60 is a spring 63 which is adapted to be compressed between arm 58 and a pin 64 carried by the rod. When the spring is compressed it tends to force rod 60 upwardly thereby to cause the extreme upper end of the rod to engage the flat portion 56,

of contact 23 to cause disengagement of detent portion 54 from cap 28. In order to hold rod 60 in retracted position and thereby prevent it from effecting such disengagement of detent portion 54 from cap 28 while the fuse holder is in connected position, pivotally mounted bracket 62 is provided with a clamping screw 65 and washer 66 assembly so that the outwardly projecting end of cable extension 31 may be connected thereto. With the fuse link within fuse holder 26 intact and drawn relatively tightly, this connection of fuse link cable extension 31 to bracket 62 serves to hold rod 60 in a downward or retracted position. Upon rupture of the fuse link during operation, cable extension 31 is released to permit rotation of bracket 62 in a counter-clockwise direction as viewed in Fig. 4 so that compressed spring 63 is operative to push rod 60 upwardly and disengage the detent portion 54 of upper contact 23 from contact cap 28. The fuse holder may then swing outwardly to its dropped out position as previously described.

In this last embodiment it is desirable to design latch release spring 63 of such strength that it will not cause undue mechanical stress upon the fuse link. It therefore is necessary also to make upper contact 23 of such size and strength that it may be easily sprung to released position by the action of the latch release spring 63, the strength of which is limited as pointed out to prevent its imposing undue stress on the fuse link. Hence in order that resilient contact element 23 may be made of sufficiently small size to insure adequate resiliency thereof and in order to provide at the same time an adequate path for current flow from contact support 14 to the upper end of the fuse holder assembly, there is provided a leaf contact 67 carried by contact support 14 and arranged to engage the metallic collar 57 on the fuse holder.

From the foregoing description, it will be readily understood that the principles of the present invention are not limited to application only with fuse cutouts of the exemplary forms illustrated and that features of the invention may be applied with advantage to other forms of switching devices, including fuse cutouts of the enclosed dropout type. Hence such other applications and modifications of the invention as do not depart from the true spirit and scope of the present invention are intended to be covered by the appended claims in which are set forth those features which I believe to be novel and my invention.

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

1. In an electric cutout, a supporting structure, spaced contact means and a resilient detent device carried by said structure, a fuse holder, means supporting said holder on said structure for swinging about a pivot point fixed relative to the holder, means carried by the holder for engagement by said detent device to restrain the holder in a position for connection of a fuse link therein between said contacts, a fuse link in the holder having a portion extending out of one end of the holder, means interconnected with said outwardly extending fuse link portion externally of the holder for normally tensioning the fuse link, and means cooperative with said last mentioned means upon rupture of said fuse link for effecting release of the holder from said detent device without bodily movement of the holder relative to its said pivot point.

2. In an electric cutout, spaced stationary contacts, a fuse holder, means adjacent one end of said holder pivotally supporting the same for connection between said contacts, a fuse link in said holder having a portion extending out of said one end of the holder, means adjacent the other end of the holder for latching the same in connected position, means carried by the holder operable independently of said pivotally supporting means for effecting release of said latching means, and means interconnecting said holder carried means and said outwardly extending fuse link portion externally of the holder for preventing said holder carried means from effecting release of said latching means while the fuse link is intact.

3. In an electric cutout, spaced stationary contacts, a fuse holder pivotally mounted adjacent its lower end for connection between said contacts, a fuse link in said fuse holder having one end fixedly anchored relative to the fuse holder and having its other end loose and extending out of an opening in the lower end of the fuse holder, latching means at the upper end of the fuse holder for maintaining the same in connected position, means at the upper end of the fuse holder movably supported thereby and operable for releasing said latching means, and means interconnecting said outwardly extending loose end of the fuse link with said releasing means for preventing operation of the releasing means to release said latching means while the fuse link is intact.

4. In an electric cutout, spaced stationary contacts, a fuse holder pivotally mounted adjacent its lower end for connection between said contacts, a fuse link in said fuse holder having a loose end extending out of an opening in one end of the fuse holder, a latch detent, means on the other end of the fuse holder arranged to be engaged by said detent for maintaining the fuse holder in connected position, means movably supported on said fuse holder operable for effecting disengagement of said last mentioned means from said detent, and means including a linkage element of insulation material interconnecting said movably supported means and said loose end of the fuse link for restraining the said movably supported means from operation to effect such disengagement while the fuse link is intact.

5. A fuse device including in combination a fuse holder adapted to have a fuse link secured therein and having an opening at one end for the outward projection of an end of the fuse link, means on the other end of the fuse holder arranged to be releasably engaged by a latch detent element, means movably carried by the fuse holder arranged for operation to effect disengagement of such latch detent from said last mentioned means, a rod like link of insulation material movably supported by the fuse holder in substantially side by side relation therewith and having one end connected with said movably carried means, and means for connecting to the other end of said rod-like link the end of a fuse link projecting from said one end of the fuse holder whereby a fuse link secured in the fuse holder may be employed to restrain said movably carried means from operation to release the latch detent while the fuse link is intact.

6. In an electric cutout, spaced contacts, a pivotally mounted fuse holder, a fuse link in said fuse holder having one end extending out of an opening in one end of the fuse holder, a lever pivotally mounted on said fuse holder adjacent the other end thereof, a latch seat on said

lever on one side of its pivotal mounting, a detent arranged to engage said latch seat for maintaining said fuse holder connected between said contacts, said detent being resiliently biased in a manner to exert force on said lever tending to rotate the lever to effect disengagement of the latch seat from the detent, and means external of said fuse holder interconnecting said outwardly extending one end of said fuse link with the end of said lever opposite to said latch seat so that the tension of said fuse link while intact exerts rotational force on said lever opposite to that exerted by said detent and thereby prevents disengagement of the latch seat from the detent.

7. In an electric cutout, spaced contacts, a pivotally mounted fuse holder adapted to accommodate therein a fuse link with one end of the link anchored in the fuse holder and the other end of the fuse link extending out of one end of the fuse holder, a lever pivotally mounted on and adjacent to the other end of said fuse holder, a latch seat on said lever on one side of its pivotal mounting, a detent arranged to engage said latch seat for holding said fuse holder connected between said contacts, said detent being resiliently biased so that when in engagement with said latch seat the detent tends to rotate said lever in one direction to effect disengagement of the latch seat from the detent, and a member of insulation material interconnected at one end with the end of said lever opposite to said latch seat, said member having means at its other end providing for the connection thereto of the end of a fuse link extending out of said one end of said fuse holder.

8. In a fuse device, a fuse holder adapted to receive a fuse link and having an opening at one end for the outward projection of a fuse link cable, an element fixedly attached to said holder adjacent the other end thereof, a substantially L-shaped member pivotally supported on said element in such manner that one leg of the L-shaped member extends substantially transversely of the longitudinal axis of said fuse holder while the other leg of the L-shaped member extends in substantially parallel side by side relation with the fuse holder, the pivot for said member being located intermediate the ends of the transversely extending leg of said member, a latch seat on the outer end of said transversely extending leg arranged to be engaged by a detent element, and means on the outer end of said parallel extending leg providing for the interconnection therewith of a fuse link cable extending out of said one end of said fuse holder.

9. In an electric cutout, spaced stationary contacts, a pivotally mounted fuse holder, a latching element normally engaging one end of said holder to maintain the same connected between said contacts, a trip member movably supported by said holder and spring biased to engage said latch element for effecting disengagement of the latch element from said one end of said holder, and a fuse link disposed in said holder with one end of the link anchored within the holder and with the other end of the link extending out the other end of the holder and interconnected with said trip member for maintaining the latter normally in a retracted position.

10. In an electric cutout, a pivotally mounted fuse holder adapted to accommodate therein a fuse link with one end of the link anchored in the fuse holder and the other end of the link extending out of one end of the fuse holder, a latching element arranged normally to engage the other end of the fuse holder, a rod-like element movably carried by the fuse holder in substantially parallel relation therewith, spring means arranged to force one end of said rod-like element into abutting engagement with said latching element to effect disengagement of the latching element from said other end of the fuse holder, and means providing for the interconnection of the other end of said rod-like element with the end of a fuse link extending out of said one end of the fuse holder whereby the rod-like element may be maintained in a retracted position against the action of said spring means while the fuse link is intact.

11. A fuse device including in combination, a fuse holder adapted to receive therein a fuse link and having at one end means for anchoring one end of the fuse link and having at the other end an opening out of which the loose end of the fuse link may extend, a rod at least partially constructed of insulation material, means carried by said holder for movably supporting said rod in substantially parallel side by side relation with the holder, a spring carried by said holder and tending to urge said rod in a direction substantially toward said one end of the holder, and means provided for interconnecting the end of said rod adjacent said other end of the holder with the loose end of a fuse link which is anchored within the holder and which has a loose end extending out of said other end of the holder whereby said fuse link while intact may be employed to hold said rod in a retracted position against the action of said spring.

12. In an electric circuit interrupting device, a support for an electric switching element, said support including a hinge bracket for pivotal mounting of a switching element and having a pair of hinge pin engaging arms extending in spaced apart substantially parallel planes, said arms being comprised of resilient wire-like prongs looped back upon themselves with the looped back portions and the main body portions of the respective prongs converging inwardly of the outer ends of the arms and then successively diverging and converging so as to provide hinge pin sockets between the two points of convergence of the respective prongs, the extreme ends of the looped back portions of the respective prongs being flared outwardly substantially in said planes and relative to the said main body portions of the prongs to provide horn-like projections for guiding hinge pins into said hinge pin sockets.

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