April 16, 1940. G. F. LINCKS 2,197,646

ELECTRIC CIRCUIT INTERRUPTER

Filed Dec. 28, 1938

Fig. 1.

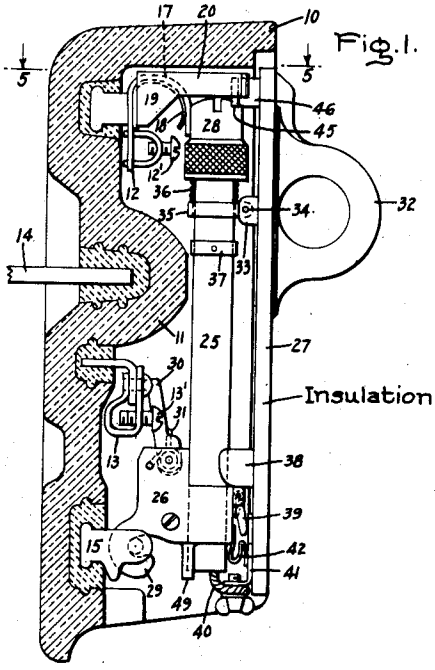


Fig. 2.

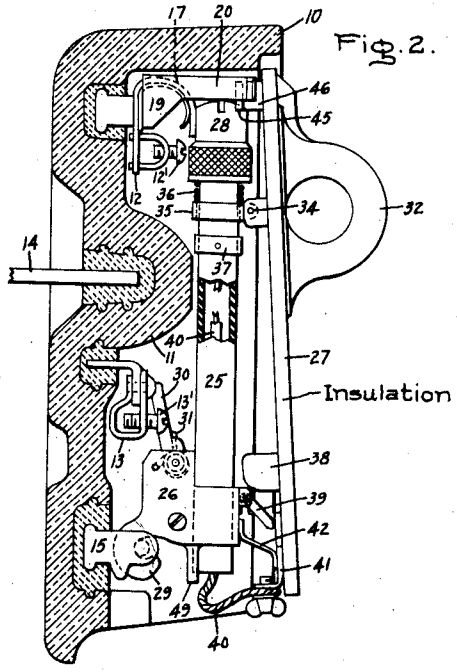


Fig. 3.

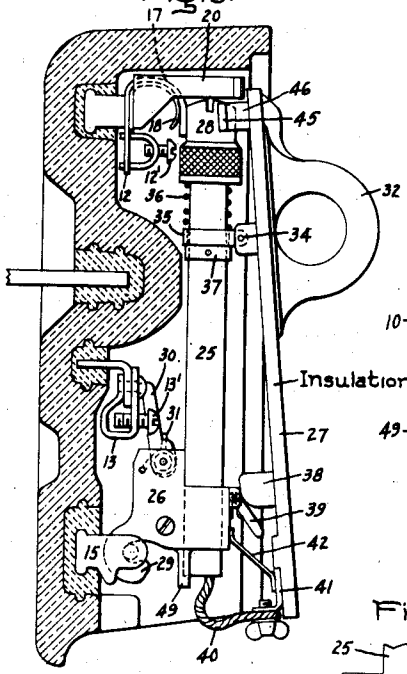


Fig. 4.

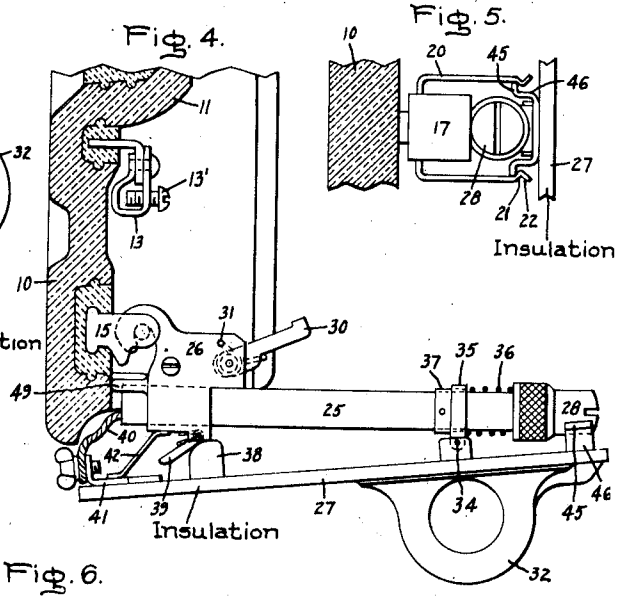
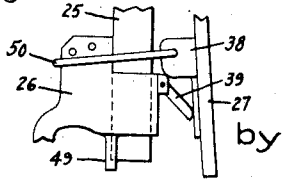


Fig. 5.

Fig. 6.



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His Attorney.

Patented Apr. 16, 1940 2,197,646

UNITED STATES PATENT OFFICE

2,197,646

ELECTRIC CIRCUIT INTERRUPTER

George F. Lincks, Pittsfield, Mass., assignor to General Electric Company, a corporation of New York

Application December 28, 1938, Serial No. 248,085

18 Claims. (Cl. 200—114)

The present invention relates to electric circuit interrupters, and has for an object the provision of an improved form of circuit interrupter incorporating mechanism capable of functioning automatically upon circuit interruption, to effect movement of a switching assembly from a connected position to a dropped-out position or other position giving indication of circuit interruption.

One of the specific objects of the invention is the provision, in a drop-out fuse cutout, of improved construction and arrangement of supporting and latching mechanism whereby release of the fuse assembly from its connected position upon fuse operation is effected without the necessity for movement of the fuse holder of the fuse assembly.

Another object is the provision, in a drop-out fuse cutout of the enclosed type, of improved mechanism whereby release of the fuse assembly from connected position upon fuse operation is effected in response to movement of a cover or door of the casing of the cutout, and independently of movement of the fuse holder of the fuse assembly.

Other objects and the details of that which I believe to be novel and my invention will become apparent from the following description and the claims appended thereto, taken in conjunction with the accompanying drawing wherein is illustrated an exemplary embodiment of the invention incorporated in a drop-out fuse cutout of the enclosed type.

In the drawing, Fig. 1 shows the parts of the exemplary cutout in their normal operative positions; Figs. 2 and 3 show the parts of the cutout in two successive stages of operation following fuse operation; Fig. 4 shows the parts in final dropped-out position; Fig. 5 is a view, taken along the line 5—5 of Fig. 1, showing details of the arrangement of the latching parts of the cutout; and Fig. 6 is a detail view of a modification which may be employed.

Referring to the drawing, 10 indicates an electric cutout casing, shown in sectional elevation, which is constructed of porcelain, glass or other suitable insulating material and which has an integrally formed electric creepage and gas barrier 11 disposed between stationary line terminal contacts 12 and 13 carried by the casing. To the rear of the casing is secured a mounting bar, partially shown at 14, for attachment of the casing to an electric line pole and cross-arm structure or other suitable supporting means. A hinge bracket 15 is secured to the inner face of the rear wall of the casing adjacent the bottom thereof. Contacts 12 and 13 are adapted to have line conductors or leads fastened thereto by means of clamping screws 12' and 13' respectively. Upper contact 12 has a contact finger 17 which is curved in a vertical plane and which is backed by means of a spring strip 18 tending to press the free end of the contact finger outwardly for a purpose to be explained hereinafter. Contact 12 is provided also with a U-shaped member 19 having resilient arms 20 extending forwardly of the casing and in horizontally spaced relationship, as best shown in Fig. 5. Arms 20 are adapted to serve as latching detents and to this end are provided with inwardly projecting detent portions 21 located just inwardly of outwardly flared guide portions 22.

Supported within casing 10 is a fuse assembly which comprises in the main a fuse holder 25, a hinge element 26, and a cover or door 27 for the open front of the casing. Holder 25, which is constructed of fibrous or other suitable insulating material, is open at the lower end for expulsion of gases therefrom and is closed at the upper end by means of a contact cap 28. Hinge element 26 is fixedly secured to holder 25 adjacent the lower end thereof and is provided with a hook portion 29 for pivotally engaging hinge bracket 15 to support the fuse assembly. A contact arm 30 is pivotally mounted on hinge element 26 and biased by means of a coil spring, indicated at 31, to engage lower stationary contact 13 when the fuse assembly is in its normal operative position illustrated in Fig. 1.

Door 27 is constructed of suitable insulation material and is provided with an eyelet handle 32 for manual operation of the fuse assembly to and from operative position. The door is provided with spaced apart ears 33, one of which is shown on the drawing, on the inner face of the door, and these ears are pivotally attached, as indicated at 34, to a collar 35 slidably mounted on fuse holder 25, so as to support the door. A coil spring 36, on and in surrounding relation to the holder, tends to effect downward movement of collar 35 and door 27 relative to the holder, and a second collar 37 is fixedly mounted on the holder to limit this downward movement. Normally the door is secured in a raised position relative to the fuse holder by engagement of bosses 38 on the door with an outer shoulder of hinge element 26. A spring biased finger 39, pivoted on element 26, presses outwardly on the door and tends to effect outward swinging of the lower end of the door about point 34 to disengage bosses 38 from element 26. However, bosses 38 normally are main-

tained in engagement with element 26 by connection of the lower end of a fuse link 40, in fuse holder 25, with a terminal clamp 41 mounted on the lower end of the door. A good electric connection is provided between terminal 41 and hinge element 26 by means of a flexible conducting strap 42.

When door 27 is secured in raised position relative to holder 25 in the manner described in the preceding paragraph, hook portions 45 of arms 46, mounted on the upper inner face of the door, are engageable with detent portions 21 of arms 20 so as to latch the door, and thereby the assembly, with fuse holder 25 in position connected between stationary contacts 12 and 13, as shown in Fig. 1. Under these circumstances, the electric circuit extends from upper stationary contact 12 through contact finger 17, terminal cap 28, fuse link 40, terminal 41, strap 42, hinge element 26, and contact arm 30 to lower stationary contact 13. Also, with the door secured relative to the fuse holder as hereinbefore described, the fuse assembly as a unit may be swung manually into and out of operative position, by means of handle 32, since the detent portions 21 of arms 20 and hook portions 45 of arms 46 are so rounded as to permit engagement and disengagement thereof by substantially lateral movement of the fuse assembly.

Upon rupture of fuse link 40 due to excess current, the lower end of the door is released so that it may swing outwardly, under the influence of spring biased finger 39, to release bosses 38 from hinge element 26, as indicated in Fig. 2. Thereupon the door moves substantially longitudinally downward relative to the fuse holder under the influence of spring 36 and gravity, to disengage latch arms 46 on the door from detent arms 20 on the casing, as indicated in Fig. 3. With the upper end of the door unlatched, spring biased contact arm 30, aided by contact finger 17 and spring strip 18, becomes effective to cause the fuse assembly to swing outwardly and downwardly, about hinge bracket 15, to the dropped-out position illustrated in Fig. 4, wherein the assembly is stopped by engagement of projections 49 on hinge element 26 with the inner bottom wall of the casing. When the assembly is in the dropped-out position, fuse holder 25 is completely disconnected from both the stationary contacts 12 and 13.

If it is desired to have, on fuse operation, only an indication without complete drop-out of the fuse assembly, this may be accomplished readily by providing means for restraining the door in its Fig. 2 position. As an example of such restraining means, there is shown in Fig. 6 a link or stirrup 50, applied between parts 26 and 38 in a manner similar to that taught in U. S. Letter Patent No. 2,081,813 to B. R. Hermann, issued May 25, 1937, and assigned to the assignee of the present invention.

From the foregoing, it will be seen that I have provided a simple mechanism for securing release of the fuse holder from its connected position upon fuse operation, which release is effected independently of, or without the necessity for, movement of the fuse holder. Thus it is made possible to support the fuse holder in a simple manner for substantially pure pivotal movement, there being no necessity for supporting the fuse holder by means of complicated toggle or other mechanism such as heretofore commonly employed for enabling the fuse holder to move, upon fuse operation, to release itself from the latching means at the upper end of the fuse assembly.

It is contemplated that with the benefit of the teachings herein set forth, there will suggest themselves to those skilled in the art other constructions and arrangements for carrying out the present invention to accomplish the stated objectives. For instance, other means than those employed in the exemplary embodiment illustrated, may be employed for supporting the door and fuse holder so that releasing action may be effected by movement of the door and independently of movement of the fuse holder. For examples of modified constructions and arrangements for carrying out the present invention, reference may be had to my copending application, Serial No. 293,966, filed September 8, 1939, and assigned to the assignee of the present invention. Also, my invention, with simple modification well within the range of mechanical skill, may be carried out with a cover member which, as in a form of door construction already known in the art, constitutes only a movable part of a complete cutout door unit. It is intended therefore that such modifications of the structure and arrangement herein illustrated, as do not depart from the true spirit and scope of the present invention, shall be covered by the appended claims.

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

1. In a drop-out cutout, a casing having spaced contacts, a fuse assembly including a fuse holder movably supported for connection between said contacts and a cover for said casing supported for movement relative to said holder, detent means on said casing engageable with an element of said assembly for releasably latching the assembly so as to maintain said holder in connected position, said element being releasable from said detent means by movement of said cover and independently of movement of said holder, means releasably securing the cover against releasing movement, said securing means being releasable responsively to operation of a fuse link in said holder, and means operative upon release of said securing means to effect movement of said cover in a manner to release said element from said detent means, thereby to permit movement of said holder from its connected position.

2. In a drop-out cutout, a casing having spaced contacts, a fuse assembly including a fuse holder and a cover for said casing, means movably supporting said assembly and including a hinge element connected with one end of said holder in fixed relation to the holder and pivotally engageable with a hinge bracket on the casing, said cover being supported for movement relative to said holder, latching means for releasably holding said assembly to maintain said holder in a position connected between said contacts, said latching means being releasable by movement of said cover and the cover being secured against such releasing movement by means releasable responsively to operation of a fuse link in said holder, and means operative upon release of said securing means to effect movement of said cover in a manner to release said latching means.

3. In an electric cutout, a casing, spaced contacts therein, a fuse holder, means supporting said holder removably in a position connected between said contacts, a cover for said casing, means movably supporting the cover and pro-

viding for movement of the cover relative to said holder, and means including cooperatively engageable latching elements on said casing and cover for releasably holding the cover in a position substantially to close a side of said casing, said holding means being releasable responsively to operation of a fuse link in said holder and said cover held as aforesaid being operative to maintain said holder in its said connected position.

4. In a drop-out cutout, a casing, spaced contacts therein, a fuse holder, hinge means to support the holder removably in a position connected between said contacts, a cover for said casing, means movably supporting the cover and providing for movement of the cover relative to the holder, said cover being releasably secured in a predetermined relation to the holder by means releasable responsively to fuse operation, means on the cover releasably engageable with means on the casing for latching the cover so as to maintain said holder in its said connected position, and means operative upon release of said securing means for effecting movement of said cover in a manner to release said latching means, thereby to permit movement of said holder from its said connected position.

5. In a drop-out cutout, a casing, spaced contacts therein, a fuse assembly hingedly supported adjacent one end on said casing and including a fuse holder and a cover for the casing connected with said holder for movement relative to the holder, means releasably securing the cover and holder in a predetermined relationship and being releasable responsively to fuse operation, means on the cover releasably engageable with means on the casing to latch said assembly in a position wherein said holder is connected between said contacts, means operative upon release of said securing means to cause the cover to move in a manner to release said latching means, and means operative upon release of the latching means to effect movement of said assembly to a position wherein said holder is disconnected from at least one of said contacts.

6. In an electric cutout, a casing having spaced upper and lower contacts and a latching detent, a fuse assembly incluing a fuse holder and a cover for said casing mounted for movement relative to said holder, means pivotally supporting the lower end of said assembly, said cover having a part engageable with said detent for holding the upper end of said assembly in position to maintain said holder connected between said contacts, said part being releasable from said detent by movement of said cover, and means releasably securing the cover against movement to release said part from said detent, said securing means being releasable responsively to operation of a fuse link in said holder.

7. In a drop-out cutout, a casing having spaced contacts and a latching detent, a fuse assembly hingedly supported adjacent one end on said casing and including a fuse holder and a cover for said casing mounted on said holder and movable relative to the holder, means releasably securing the cover against movement relative to the holder and being releasable responsively to operation of a fuse link in the holder, a latching element on the cover releasably engageable with said latching detent to hold said assembly in a position wherein the holder is connected between said contacts, and means to effect movement of the cover in a manner to release said element from said detent upon release of said securing means.

8. In a drop-out cutout, a casing having spaced contacts, a fuse assembly including a fuse holder and a cover for said casing mounted on said holder and movable relative to the holder, a hinge element connected with the holder in fixed relation thereto and pivotally engageable with a hinge bracket on said casing for supporting said assembly, means for releasably latching the assembly with said holder in connected position, said latching means being releasable by movement of said cover relative to said holder, means releasably securing the cover in a predetermined relation to the holder so as to restrain the cover from movement to release said latching means, said securing means being releasable responsively to operation of a fuse link in said holder, and means operative upon release of said securing means to cause said cover to move relative to said holder in a manner to release said latching means.

9. In a drop-out cutout, a casing having spaced contacts and a latching detent, a fuse holder pivotally supported in the casing in a position connected between said contacts, a cover for an open side of the casing supported for movement relative to said holder and having a part engageable with said detent to maintain the holder in its said connected position, said part being disengageable from said detent by movement of the part in a direction substantially longitudinal of said holder, means releasably securing said cover against movement in a manner to effect disengagement of said part from said detent, said last means being releasable responsively to operation of a fuse link in said holder, and means operative upon release of said securing means to cause said cover to move in a manner to move said part in the aforesaid direction to disengage the part from said detent.

10. In a drop-out cutout, a casing, spaced contacts therein, a fuse assembly including a fuse holder and a cover for the casing mounted for movement relative to and substantially longitudinally of said holder, hinge means pivotally supporting said assembly, means releasably latching the assembly with said holder in an operative position relative to said contacts, said latching means being releasable responsively to movement of the cover substantially longitudinally relative to said holder, and means releasably securing the cover against such releasing movement, said securing means being releasable responsively to operation of a fuse link in said holder.

11. In a drop-out cutout, a casing having spaced upper and lower contacts and a latching detent, a fuse assembly including a fuse holder and a cover for an open side of said casing, hinge means adjacent the lower end of said assembly for movably supporting the assembly, and a latching element on said cover engageable with said detent to releasably hold the assembly in a position wherein said holder is connected between said contacts, said cover being supported for downward movement relative to said holder to release said element from said detent and the cover being secured against such downward movement by means releasable responsively to fuse operation.

12. In a drop-out cutout, an insulating support having spaced contacts, a fuse assembly including a fuse holder and a member mounted on said holder for bodily movement relative to and substantially longitudinally of the holder, hinge means adjacent one end of the holder for pivot-

ally supporting said assembly on said support, means for releasably latching said assembly with said holder in a connected position relative to said contacts, said latching means being releasable by movement of said member relative to said holder in a direction substantially toward said hinged end of the holder, and means for releasably securing said member in predetermined relation to the holder to prevent such releasing movement of the member, said securing means being releasable responsively to operation of a fuse link in the holder.

13. In a drop-out cutout, an insulating support having spaced upper and lower contacts, a fuse assembly including a fuse holder and a member mounted for movement relative to and substantially longitudinally of said holder, a part of said member extending into proximity with the lower end of said holder, hinge means adjacent the lower end of the holder for pivotally supporting said assembly with the holder in a connected position relative to said contacts, latching means for releasably holding said assembly with said holder in connected position, said latching means being releasable by substantially longitudinally downward movement of said member relative to said holder, and means including a fuse link in said holder having a portion connected with said part of said member for releasably securing the member in a raised position, said securing means being releasable responsively to rupture of said fuse link so as to permit downward movement of said member to release said latching means.

14. In a circuit interrupter, a casing having spaced contacts, a switching assembly movably supported on said casing and including a switch element for connection between said contacts and a cover for the casing supported for movement relative to said switch element, latch means on said casing engageable with a cooperative part of said assembly for releasably latching the assembly so as to restrain said switch element in a connected position, said part being releasable from said latch means by a certain movement of said cover and independently of movement of said switch element, and means operative dependently upon occurrence of a predetermined circuit conditon for effecting movement of said cover relative to said switch element and in a manner to effect release of said part from said latch means.

15. In a circuit interrupter, a casing having spaced contacts, a switching assembly including a switch element for connection between said contacts and a cover for said casing, means movable supporting said assembly and including a hinge element connected in fixed relation to said switch element and pivoted on the casing, said cover being supported for movement relative to said switch element, latching means for releasably holding said assembly so as to restrain the switch element in a connected position, said latching means being arranged so as to be rendered inoperative by movement of said cover and independently of movement of said switch element, and means operative dependently upon occurrence of a predetermined electric circuit condition for effecting movement of the cover in a manner to render said latching means inoperative.

16. In a circuit interrupter, a casing having spaced contacts, a switching assembly hinged adjacent one end on said casing and including a switch element for connection between said contacts and a cover supported for movement relative to said switch element, said cover having a part engageable with latching means on said casing for latching said assembly so as to restrain said switch element in a connected position, which said part is releasable from said latching means on the casing by a certain movement of the cover relative to said switch element, and means releasably securing the cover against such latch releasing movement, which said securing means is operative to release the cover in response to occurrence of a predetermined electric circuit condition.

17. In a circuit interrupter, an insulating support having spaced contacts, a switching assembly hinged adjacent one end on said support and including a switch element for connection between said contacts and a member supported for bodily movement relative to and substantially longitudinally of said switch element, means for releasably latching said assembly so as to restrain said switch element in a connected position, said latching means being releasable by movement of said member relative to said switch element in a direction generally toward the hinged end of said assembly, and means for releasably securing said member in predetermined relation to said switch element so as to restrain said member from such releasing movement, said securing means being operative to release said member in response to occurrence of a predetermined electric circuit condition.

18. In a circuit interrupter, an insulating support having spaced contacts, a switching assembly hinged adjacent one end on said support and including a switch element for connection between said contacts and a member supported for bodily movement relative to and substantially longitudinally of said switch element, said member having a part engageable with a cooperative part on said casing to releasably latch said assembly so as to restrain said switch element in a connected position, said parts being disengageable by movement of said member relative to said switch element in a direction generally toward the hinged end of said assembly, and means operative dependently upon occurrence of a predetermined electric circuit condition for effecting such disengaging movement of said member.

GEORGE F. LINCKS.