July 4, 1939. L. P. SOHLES 2,165,015

ELECTRIC CUT-OUT

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Fig. 1.

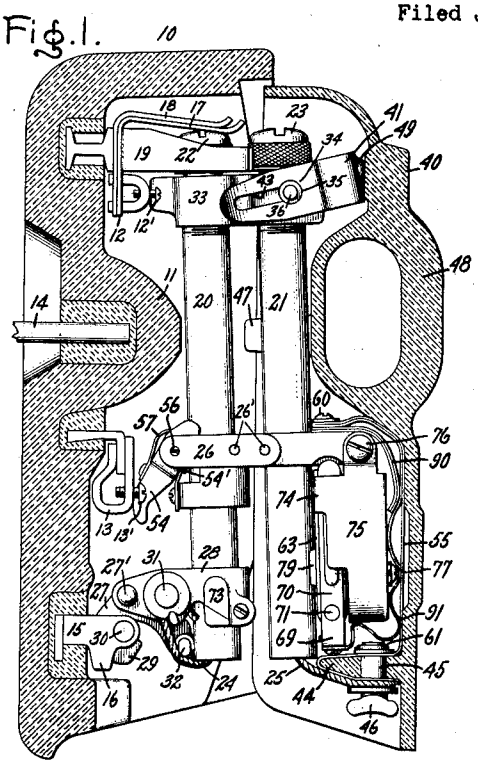


Fig. 3.

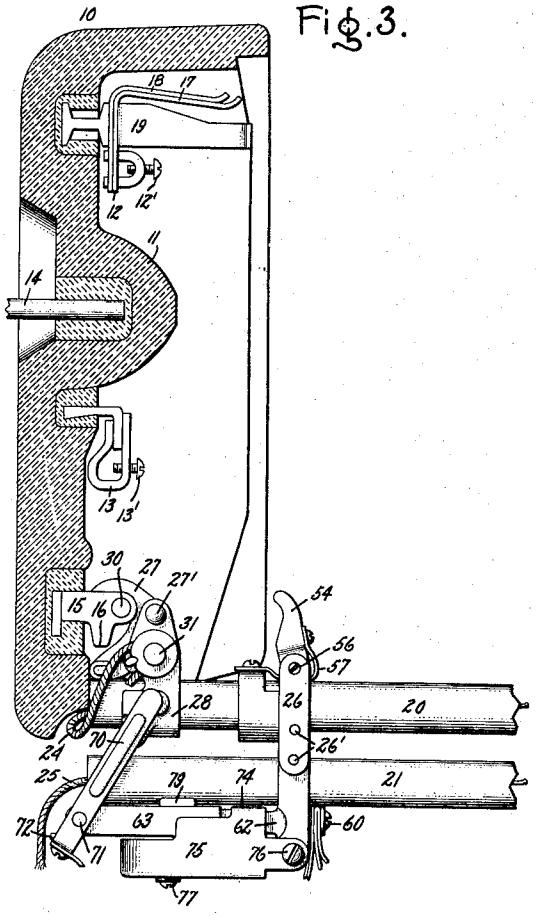


Fig. 2.

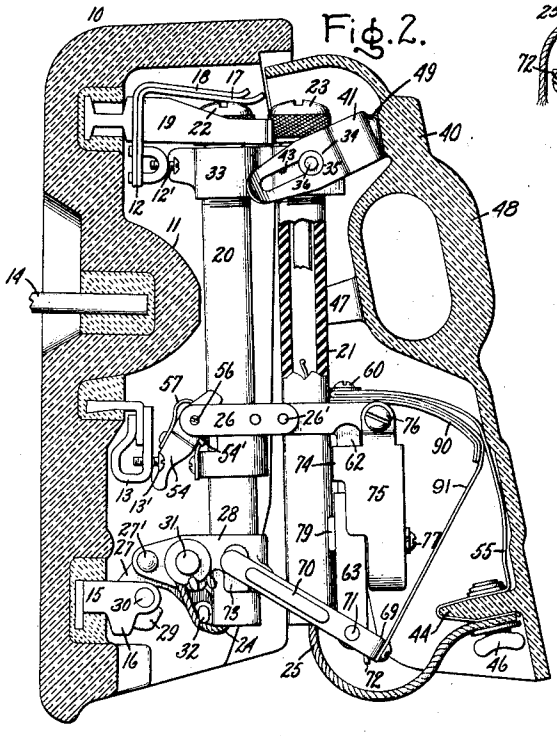


Fig. 4.

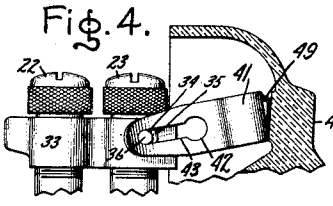
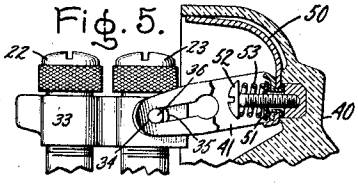


Fig. 5.



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Fig. 6.

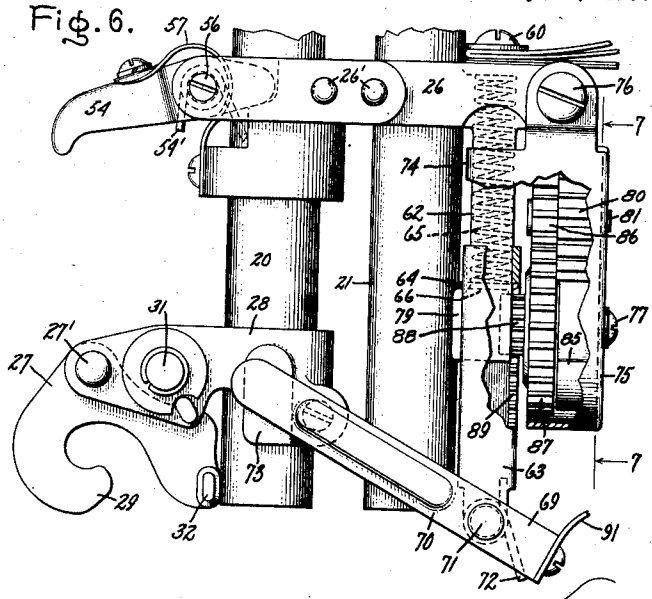


Fig. 7.

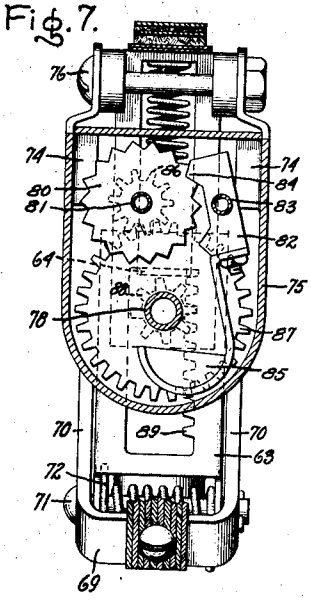
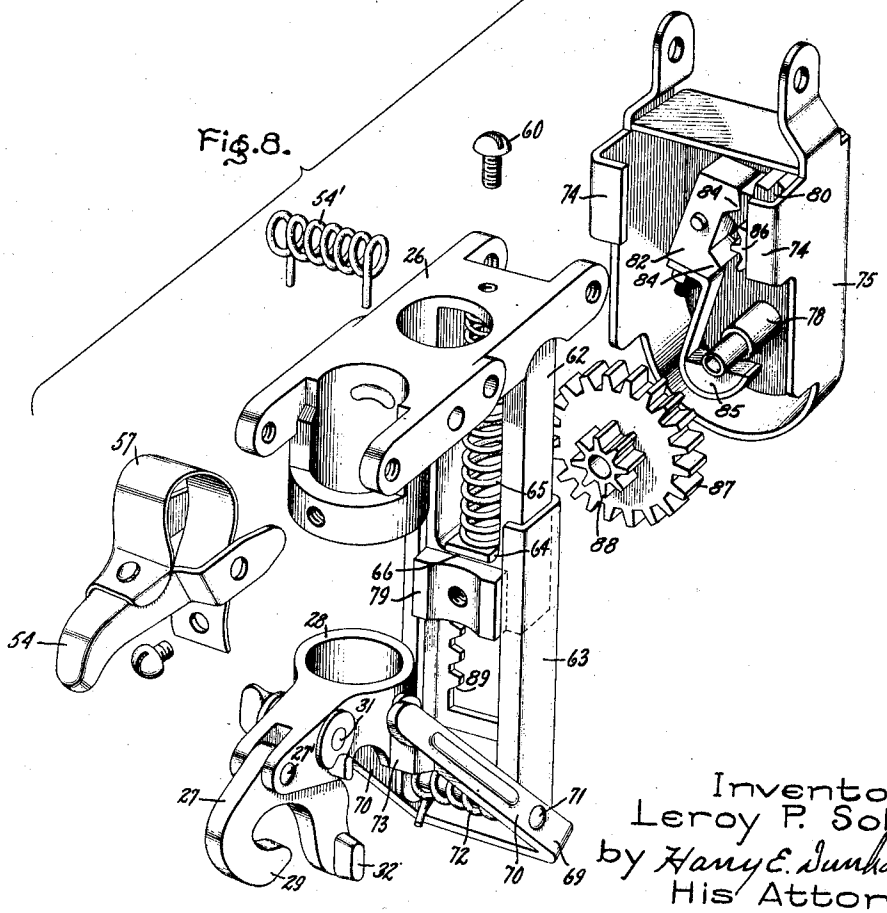


Fig. 8.



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UNITED STATES PATENT OFFICE

2,165,015

ELECTRIC CUT-OUT

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Application July 14, 1937, Serial No. 153,568

21 Claims. (Cl. 200—126)

The present invention relates to electric cutouts and has for one of its objects the provision of improvements in fuse cutouts particularly of the automatic circuit reclosing type.

Another object of the invention is the provision of a circuit reclosing fuse unit of improved construction and arrangement of parts for use in an electric cutout.

A further object of the invention is the provision of improved circuit reclosing mechanism and time delay mechanism for use therewith.

As to certain features of the present invention, a still further object is the provision of improved mechanism for carrying out the inventions of the copending applications of G. F. Lincks, Serial No. 153,508 and R. S. Bennett, Serial No. 153,529, both of which applications were filed concurrently with the present application and are assigned to the assignee of the present invention.

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 drawings. While my invention may be incorporated in cutouts of either the open type or the enclosed type, as will become apparent hereinafter, I have chosen, as the best means of conveying a complete understanding of all features of the invention, to illustrate and describe an exemplary embodiment thereof as incorporated in an enclosed fuse cutout of the drop-out type.

In the drawings, Fig. 1 shows the parts of the exemplary cutout in their normal operative positions; Fig. 2 shows the relative positions of the parts of the cutout after operation of one of the fuses therein; Fig. 3 shows in part the positions occupied by the fuses after drop-out following operation of the final one of the fuses; Fig. 4 is a detail view of one form of latching means for securing a cutout door to a fuse assembly; Fig. 5 is a detail view of an alternative form of latching means for securing a cutout door to a fuse assembly; Fig. 6 is an enlarged detail view of the fuse holder supporting parts and circuit reclosing mechanisms of the cutout of the exemplary embodiment; Fig. 7 is a sectional view along the lines 7—7 of the structure of Fig. 6 and Fig. 8 is a detail exploded view of the fuse holder supporting parts, circuit reclosing mechanism and timing mechanism.

Referring to the drawings, 10 indicates an electric cutout casing of the type commonly employed in non-reclosing fuse cutout installations. This casing is constructed of porcelain or other suitable insulating material and 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 14 for the attachment of the casing to an electric line pole and cross-arm structure or the like. A hinge bracket 15 is secured to the inner face of the rear wall of the casing adjacent the bottom thereof and is provided with a stop 16 for engagement by a dropped-out fuse holder assembly. Contacts 12 and 13 are adapted to have line conductors or leads fastened thereto by means of clamping screws 12' and 13' respectively, and upper contact 12 has a contact finger 17 backed up by means of a spring strip 18, which serves to press the finger 17 downwardly, and has also a pair of spaced resilient contact fingers 19, one of which is shown in the drawings, which are arranged to receive a fuse holder terminal cap therebetween.

In the exemplary embodiment illustrated, there are provided a pair of fuse holders 20 and 21 of the expulsion type which consist of fuse tubes of insulating material having contact caps 22 and 23 respectively screwed on the upper ends thereof and which have fuse links disposed therein with the upper ends of the fuse links connected respectively to the caps 22 and 23 and the lower ends of the fuse links extending out of the bottoms of the fuse tubes as indicated at 24 and 25 respectively. Although in the exemplary embodiment, only two fuse holders are employed, it will be apparent from the ensuing description that the present invention may be carried out with more than two fuse holders if desired.

Fuse holders 20 and 21 are held rigidly in parallel side-by-side relationship by means of a fuse holder supporting element 26 which has openings for receiving the fuse holders as best shown in the detail view of Fig. 8. The fuse holders are held tightly in the supporting element by means of pins 26' which pass through the supporting element into engagement with the fuse holders. The two fuse holders and their supporting element constitute part of a unitary assembly which is removably supported in casing 10 by means of a lever element 27, one end of which is pivotally attached, by means of pin 27', to a terminal collar 28 clamped on the lower end of fuse holder 20 and the other end of which lever element has a hook-shaped portion 29 for detachable engagement with a hinge pin 30 car-

ried by hinge bracket 15. As will be seen from the drawings, terminal collar 28 is normally electrically isolated from the stationary contacts of the cutouts by means of a portion of the insulating tube of fuse holder 20. Lever 27 is arranged to be normally latched in rigid relation to fuse holder 20 by means of fuse link extension 24 which is anchored to terminal collar 28 by means of a clamping device 31 and which engages a projection 32 on the lever as shown in Fig. 1. With the lever hingedly attached to bracket 15 and held in rigid relation to fuse holder 20 and with the unitary fuse assembly in its normal operative position illustrated in Fig. 1, contact cap 22 of fuse holder 20 is latched between spring contact fingers 19 with contact finger 17 pressing downwardly on the top thereof. Thus the upper end of the fuse link in fuse holder 20 is normally connected with the upper stationary contact 12 while the lower end of the fuse link in fuse holder 20 is normally disconnected from lower contact 13 for the reason, previously pointed out, that terminal collar 28 to which it is connected is normally electrically isolated from contact 13. By means of the arrangement just described, wherein contact cap 22 is latched between spring contact fingers 19 and hinge lever 27 is latched in rigid relation to fuse holder 20 by fuse link extension 24, the fuse assembly is held in its normal operative position so long as the fuse link in fuse holder 20 remains intact, and, as will be pointed out hereinafter, the fuse link in fuse holder 20 is arranged to be the last or final one to operate.

Contact caps 22 and 23 on the tops of fuse holders 20 and 21 respectively are electrically connected together by means of a metal clamp 33 which has openings for receiving the fuse holders and which is fastened to the upper ends of the fuse holders in engagement with the contact caps 22 and 23. In addition to electrically connecting the two contact caps so as to connect the upper end of the fuse link in fuse holder 21 with contact cap 22 and upper stationary contact 12, the clamp serves also to aid in maintaining the fuse holders in proper relationship. On opposite sides of the clamp and adjacent the outer end thereof are bosses 34 each of which has an inner portion 35 of relatively large diameter and an outer portion 36 of relatively smaller diameter.

A cutout casing door 40 is attached to the fuse holder assembly by means of a retaining clip 41 secured to the inner face of the door and having spaced resilient arms arranged to receive clamp 33 therebetween. As best shown in Fig. 4, each of the arms of clip 41 has an opening 42 of sufficiently large diameter to receive the larger diameter portion 35 of one of the bosses 34 and has also an elongated slot 43 in communication with opening 42 but only of sufficient width to receive the smaller diameter portion 36 of one of the bosses 34. Normally the larger diameter portions 35 of the bosses are in engagement with the openings 42 to hold the upper end of the door in its inward position relative to the fuse holders as illustrated in Fig. 1. By spreading the arms of clip 41 outwardly sufficiently that the smaller diameter portions of bosses 34 may travel in slots 43, the fuse holders may be moved away from the door to the extent permitted by the length of slots 43, and without complete detachment of the fuse holders from the door, for a purpose to be pointed out hereinafter. On the inner face of the door adjacent the lower end thereof, there is formed a projection 44 which carries a fuse terminal 45 to which is secured, by means of winged clamping screw 46, the extension portion 25 of the fuse link in fuse holder 21 to hold the lower end of the door normally in rigid relation to the fuse holder assembly. The door is provided also with an integrally formed barrier 47 arranged to cooperate with barrier 11 on the fuse casing to retard the passage of expansion gases from the lower end the fuse holders upwardly around the upper fuse terminal means and upper stationary contacts. On the outer face of the door there is formed an eyelet handle 48 which may be either grasped manually or engaged by a suitable form of switch stick to swing the fuse assembly inwardly or outwardly about hinge pin 30.

Fuse cutout casings, as ordinarily employed with non-reclosing fuse cutout installations, are relatively shallow since it is necessary for them to accommodate ony a single fuse holder. Such casings would have insufficient depth to accommodate a plural fuse holder assembly of the type illustrated. An important feature of the present invention is the provision of a circuit reclosing fuse unit which may be employed to convert a non-reclosing fuse cutout to a reclosing fuse cutout without modification of the cutout supporting structure. For this reason, it is highly desirable to provide a door of special design having in the inner face thereof a recess for the accommodation of fuse holder 21 and the circuit reclosing mechanism, to be described hereinafter, which would project beyond the open side of a cutout casing, such as the one illustrated, of the type ordinarily provided in non-reclosing cutout installations. Thus it is made possible to install a reclosing fuse unit of the type illustrated in a relatively shallow casing primarily designed for the accommodation of a non-reclosing fuse unit and to have the door properly close the open side of the casing to prevent exposure of the internal parts to adverse weather conditions. The quick releasable latch provided by clip 41 permits outward movement of the fuse holders from the door recess to the extent allowed by slots 43 and without detachment of the fuse holders from the door, to provide ready access to the upper ends of the fuse holders for removal of contact caps 22 and 23 and installation of fuse links in the fuse holders. After installation of fuse links therein, the fuse holders may be snapped back into place in the door recess until the enlarged portions of bosses 34 engage openings 42 of the arms of clip 41.

Clip 41 may be secured to door 40 either rigidly as indicated at 49 in Fig. 4 or resiliently by means of a spring strip 50, eyelet 51, screw 52, and spring 53 as shown in the alternative form of Fig. 5. The flexible connection between the door and the fuse holders by the means illustrated in Fig. 5 has the advantage of to some extent absorbing the recoil of the fuse assembly upon fuse operation so that insufficient recoil is transmitted to the door to cause damaging impact of the upper edge of the door against the cutout casing.

As previously pointed out, the upper end of the fuse link in the outer fuse holder 21 is normally connected with upper contact 12 by means of terminal cap 23, clamp 33, terminal cap 22, and contact fingers 17 and 19. In order normally to connect the other end of the fuse link in fuse holder 21, or fuse link extension 25, with the lower stationary contact 13, a contact engaging arm 54 is mounted on the inner end of fuse holder supporting element 26 and a flexible shunt strip 55 of high conductivity metal is secured to the outer

end of supporting element 26. Contact engaging arm 54 is pivotally mounted on supporting element 26 as indicated at 56 and is biased by means of coil spring 54' into engagement with contact 13. A path of good electrical conductivity between supporting element 26 and contact arm 54 is provided by a flexible metallic shunt strip 57. The force exerted by contact arm 54 against contact 13 under the influence of spring 54' tends to move the fuse assembly outwardly from the casing but such outward movement is prevented due to the fact that hinge lever 27 normally is latched in rigid relation to fuse holder 20 by means of fuse link extension 24. Shunt strip 55 is fastened at one end to the outer end of supporting element 26 by means of screw 60 and is clamped at its other end to terminal 45 and the door projection 44 as indicated at 61. Thus the normal circuit between contacts 12 and 13 extends through contact fingers 17 and 19, terminal cap 22, clamp 33, terminal cap 23, the fuse link in fuse holder 21, fuse link extension 25, terminal 45, shunt strip 55, supporting element 26, shunt strip 57 and contact engaging element 54.

In order to secure reclosure of the electric circuit through the fuse link in the inner fuse holder 20 upon operation of the fuse link in fuse holder 21, I have provided an improved circuit reclosing mechanism which is mounted on the outer end of the fuse holder supporting element 26. The details of this circuit reclosing mechanism will be seen best by reference to Figs. 6 to 8 inclusive. Depending from fuse holder supporting element 26 is a guide member 62 which has two spaced apart arms for supporting a U-shaped switch supporting element 63 having two arms of channel-shaped cross section arranged to slide vertically on the outer surfaces of the arms of guide member 62. Element 63 is formed with an inwardly projecting bearing plate 64 against which presses the lower end of a spring 65 disposed between the arms of guide member 62. The upper end of spring 65 bears against the lower surface of fuse holder supporting element 26 and is arranged to be held in place by means of screw 60. This spring tends to force element 63 downwardly until bearing plate 64 engages the upper surface of a connecting web 66 which extends between the two arms of guide member 62. A U-shaped switch element 69 having contact arms 70 is rotatably mounted on the lower end of slidably supported element 63 by means of pivot pin 71 which extends between the two arms of element 63. Contact arms 70 are biased, by means of coil spring 72, to rotate in a counterclockwise direction, as viewed in the drawings into engagement with the bearing seats of two contact terminals 73 respectively disposed on opposite sides of the terminal collar 28 which is mounted on the lower end of fuse holder 20. The bearing surfaces of the terminal contacts 73 are slightly tapered to insure wedging of contact arms 70 into firm electrical conductive engagement with the terminal contacts. Element 63 and the contact arms 70 carried thereby are arranged to be held normally in their uppermost position, as viewed in Fig. 1, against the action of spring 65, by means of the detent foot 44 carried by door 40, which detent foot is normally held in engagement with the lower end of switch element 69 by fuse link extension 25. When element 63 is in its uppermost position, contact arms 70 are held in parallel relationship therewith and in their open circuit position, out of engagement with contact terminals 73, by means of detent projections 74 which are carried by a casing 75 attached to fuse holder supporting element 26 by means of bolt 76, as best shown in Fig. 7. The lower end of casing 75 is held in proper relation to guide member 62 by means of a screw 77 which extends through a bearing sleeve 78, mounted on the inner surface of casing 75, into threaded engagement with a plate 79 fastened to the connecting web portion 66 of member 62. If desired, other forms of detents or stops may be substituted for the projections 74 and may, if desired, be supported directly from fuse holder supporting element 26.

I have provided a time delay mechanism, in the form of a mechanical escapement which is mounted in casing 75, for delaying reclosure of the electric circuit through the fuse link in fuse holder 20 upon operation of the fuse link in fuse holder 21, so as to make it possible for a temporary fault to clear itself or be permanently cleared by operation of the first fuse before circuit reclosure through the second fuse. This time delay mechanism comprises a toothed escape wheel 80 rotatably mounted on a shaft 81 carried by casing 75 and the rotation of which is arranged to be controlled by an inertia lever 82 pivotally mounted on a shaft 83 carried by casing 75. This lever has detent pawls 84 arranged to engage the teeth of escape wheel 80 and the oscillation of lever 82 is controlled by means of inertia weight 85 suspended from the lower end of the lever. Mounted rigidly for rotation with escape wheel 80 about shaft 81 is a pinion gear 86 arranged to engage gear wheel 87 mounted on bearing shaft 78, and gear 87 has a pinion gear 88 rigidly mounted for rotation therewith about shaft 78 and arranged to engage a toothed rack 89 carried by and projecting inwardly from one of the arms of slidably mounted element 63. With this arrangement, downward movement of element 63 under the influence of spring 65 is retarded by means of the mechanical escapement and the connecting gear train. The speed of rotation of the gear train and thereby the speed of downward movement of element 63 may be controlled as desired by the proper selection of inertia weights 85 to be hung on the lower end of lever 82.

Door 40 is biased for outward movement by means of a leaf spring 90 which is attached to the outer end of fuse holder supporting element 26 by means of screw 60. A flexible shunt strip 91 of high conductivity metal, which strip may be a continuation of the flexible shunt strip 55 or may be a separate strip, is connected between fuse holder supporting element 26 and switch element 69 to provide a good electrical path from the fuse holder supporting element to the rotatable contact arms 70.

With the parts of the device in their normal operative positions as shown in Fig. 1, operation of the fuse link in fuse holder 21 releases fuse link extension 25 to permit the lower end of door 40 to swing outwardly about bosses 34 under the influence of leaf spring 90. Detent foot 44 thereby is moved out of engagement with switch element 69 so as to permit downward movement of element 63 under the influence of spring 65. This downward movement is retarded by the mechanical escapement time delay mechanism so as to delay the release of the upper ends of the contact arms 70 from detents 74. However, upon downward movement of element 63 to a sufficient extent to release contact arms 70 from detents 74, the contact arms rotate quickly into

engagement with contact terminals 73, this rotation being, as is desirable, a snap action under the influence of spring 72. Upon engagement of contact arms 70 with terminal contacts 73, a connection is completed between fuse terminal collar 28 and contact engaging arm 54 so that the circuit is reclosed through the fuse link in fuse holder 20. The circuit between the spaced stationary contacts 12 and 13 now extends through contact fingers 17 and 19, contact cap 22, the fuse link in fuse holder 20, fuse link extension 24, terminal collar 28, terminal contacts 73, contact arms 70, shunt strip 91, fuse holder supporting element 26, shunt strip 57 and contact engaging element 54. Under these conditions the positions of the parts of the device are as illustrated in Fig. 2, the door being in a partially open position to give indication of operation of the fuse link in fuse holder 21 while at the same time providing protection for the internal parts of the cutout from adverse weather conditions.

In case of continuing or recurring fault current, the fuse link in fuse holder 20 will operate to release fuse link extension 24 which in turn will release supporting hinge lever 27. Thereupon the lower end of the fuse holder assembly swings outwardly and downwardly under the influence of the pressure exerted by contact engaging element 54 against lower contact 13. After a sufficient outward and downward movement of the lower end of the assembly, contact cap 22 becomes disengaged from contact fingers 19 to permit downward swinging of the assembly under the influence of gravity to dropped-out position wherein both of the fuse holders of the assembly are disconnected from the stationary contacts. In the dropped-out condition, the fuse holders and circuit reclosing mechanism occupy the positions illustrated in part in Fig. 3, the lower end of fuse holder 20 being in abutment with the lower edge of casing 10 to prevent rotation of the assembly below a substantially horizontal position.

To replace ruptured fuse links, the fuse assembly is removed from casing 10 and the arms of retaining clip 41 are spread sufficiently to allow the smaller diameter portions 36 of bosses 34 to slide into elongated slots 43 of clip 41 so that the fuse holders may be moved out of the recess in the door to the extent permitted by the length of slots 43, for removal of contact caps 22 and 23 and insertion of new fuse links in the fuse holders 20 and 21. After new fuse links are installed and the contact caps are screwed on the fuse holders, the fuse holders are pressed back into the door recess until the larger diameter portions 35 of bosses 34 engage openings 42 of clip 41 to latch the upper ends of the fuse holders in place. Then contact arms 70 are rotated into parallel relationship with their supporting element 63 and the supporting element is pushed upwardly until the contact arms engage detents 74. To hold the supporting element and contact arms in their upper positions, the lower end of the door is swung inwardly about bosses 34 to bring detent foot 44 into engagement with the lower end of switch element 69 and the lower end of the door is fastened in its inward position by anchoring the extension of the fuse link in fuse holder 21 to fuse terminal 45. As a final operation, lever 27 is latched in rigid relation to fuse holder 20 by passing the extension of the fuse link in fuse holder 20 about the projection 32 of the lever 27 and then clamping the fuse link extension to fuse terminal collar 28 by means of clamp 31. The fuse assembly is then ready to be mounted in the casing by engaging the hook-shaped portion of lever 27 with hinge pin 30 and swinging the assembly upwardly about the hinge pin until upper contact fingers 17 and 19 engage contact cap 22 on fuse holder 20 to hold the assembly in normal operative position.

From the foregoing description, it will be apparent that I have provided a circuit reclosing apparatus which has an improved construction and arrangement of parts and which may be furnished to electric operating companies and the like in the form of a single unit embodying a plurality of fuse holders, circuit reclosing mechanism and time delay mechanism with the necessary connections and means for detachably mounting the unit on a cutout supporting structure of standard design. Such a unit has, among others, the advantages that it may be used as a replacement for similar units or may be made interchangeable with fuse units of the non-reclosing type so that, without modification of the cutout supporting structure and stationary contacts carried thereby, an electric cutout of the non-reclosing type may be converted readily to one of the reclosing type, or vice versa, without the necessity for removal of the cutout supporting structure from the line pole or the like upon which the supporting structure is mounted in the field.

It will be apparent also to one skilled in the art that my present invention in its broader aspects is not limited to the particular details of the exemplary cutout illustrated. For example, by simple modifications well within the range of mechanical skill, such as by substituting for the cutout door an equivalent movably mounted detent and terminal carrying member, the illustrated reclosing unit may be adapted for use also in cutouts of the open type.

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

1. In an electric cutout, the combination of a casing, spaced contacts therein, a door for normally closing an open side of the casing, a plurality of fuse holders supported in the casing, said door being mounted for movement relative to said casing and holders, means for connecting a fuse link in one of said holders between said contacts, means operable responsively to operation of a fuse link in said one holder for effecting movement of said door from its normal closing position, and circuit reclosing means operable responsively to movement of the door relative to said casing and holders for completing a connection of a fuse link in another of the holders between said contacts.

2. An electric cutout including in combination a casing having an open side, spaced stationary contacts carried thereby, a fuse assembly supported in said casing and including a plurality of fuse holders, a door mounted for movement relative to said casing and fuse holders and arranged normally to close the open side of the casing, means for connecting a fuse link in one of said holders between said contacts, normally open switching means operable for completing an electric connection of a fuse link in another of said holders between said contacts, means operable responsively to operation of a fuse link in said one holder for effecting movement of said door relative to said casing and holders, and means releasable by movement of the door relative to said casing and holders for effecting operation of said switching means.

3. An electric cutout including in combination,

a casing having an open side, spaced stationary contacts carried thereby, a plurality of fuse holders supported in the casing, a door supported for movement relative to the casing and said holders and arranged normally to close the open side of the casing, means for connecting a fuse link in one of said holders between said contacts, means releasable by operation of a fuse link in said one holder for effecting movement of said door relative to said casing and holders to a partially open position, a normally open switch operable for completing an electric connection of a fuse link in another of said holders between said contacts, means releasable in response to movement of said door relative to said casing and holders for effecting operation of said switch, and timing mechanism connected for controlling the operation of said last-mentioned means.

4. An electric cutout including in combination a casing, spaced stationary contacts carried thereby, a door movably mounted and arranged normally to close an open side of said casing, a fuse assembly movably supported in the casing and including a plurality of fuses arranged to be connected successively between said contacts, means for holding said assembly in normal operative position and arranged to be released by operation of the final fuse connected between said contacts, automatic circuit reclosing mechanism for connecting a succeeding fuse between said contacts upon operation of a fuse precedingly connected between the contacts, means operable responsively to operation of one of said fuses for effecting movement of said door to an indicating position, and means operable upon release of said holding means due to operation of the final fuse of the assembly for effecting movement of said assembly from normal operative position to a position wherein all of said fuses are disconnected from at least one of said contacts.

5. In an electric cutout, the combination of a casing, spaced contacts therein, a fuse holder assembly including a first fuse holder and a second fuse holder and common carrying means therefor, means movably supporting said assembly in said casing, a door supported for movement relative to said assembly and arranged normally to close an open side of the casing, means for holding said assembly in normal operative position relative to said contacts, means for connecting a fuse link in said first holder between said contacts, means operable responsively to operation of a fuse link in said first holder for effecting movement of said door from normal position without movement of said assembly from normal operative position, and means operable responsively to movement of the door relative to the assembly for completing connection of a fuse link in said second holder between said contacts, said holding means being releasable in response to operation of a fuse link in said second holder and said assembly being movable to dropped-out position upon release of said holding means.

6. In an electric cutout, the combination of spaced stationary contacts, a fuse assembly supported for movement relative to said contacts and including a plurality of fuse holders having common carrying means, means for connecting a fuse link in one of said holders between said contacts when said assembly is in normal operative position, means for holding said assembly in normal operative position and arranged to be released by operation of a fuse link in another of said holders, automatic circuit reclosing means operable responsively to operation of a fuse link in said one holder for connecting a fuse link in said other holder between said contacts, and means operable upon release of said holding means due to operation of a fuse link in said other holder for effecting movement of said assembly from normal operative position to a position wherein said holders are disconnected from at least one of said contacts.

7. In an electric cutout, the combination of spaced stationary contacts, a fuse assembly including a plurality of fuse holders having common carrying means, means for connecting a fuse link in one of said holders between said contacts when the assembly is in normal operative position, means for supporting the assembly removably in normal operative position including a hingedly mounted lever pivotally connected with the assembly, means for holding said lever in rigid relation to the assembly and arranged to be released by operaton of a fuse link in another of said holders, a normally open switch operable for completing a connection of a fuse link in said other holder between said contacts, means releasable by operation of a fuse link in said one holder for effecting operation of said switch, and means operable upon release of said lever holding means due to operation of a fuse link in said other holder for effecting movement of said assembly to a position wherein said holders are disconnected from at least one of said contacts.

8. In an electric cutout, the combination of spaced stationary contacts, a fuse assembly including a plurality of fuse holders and common carrying means therefor, means for connecting a fuse link in one of said holders between said contacts when said assembly is in normal operative position, a terminal associated with another of said holders for connection with one end of a fuse link therein and normally isolated from one of said contacts, means for supporting said assembly removably in operative position including a hingedly mounted lever pivotally connected with the assembly, means for holding said lever normally in rigid relation to said other fuse holder and arranged to release the lever upon operation of a fuse link in said other holder, means carried by said assembly for connecting a fuse link in said other holder between said contacts including a normally open switch operable for completing an electric connection between said one contact and said terminal, means operable responsively to operation of a fuse link in said one holder for effecting operation of said switch, and means operable upon release of said lever holding means for effecting movement of said assembly from normal operative position to a position wherein said holders are disconnected from at least one of said contacts.

9. In a circuit reclosing fuse unit adapted to be removably supported in an electric cutout casing, the combination of a cutout casing door, a fuse holder assembly movably attached to said door and including a plurality of fuse holders, means for connecting a fuse link in one of said holders in an electric circuit, switching mechanism including a circuit-closing element normally in an open circuit position and operable to a circuit-closing position for completing an electric connection through a fuse link in another of said holders, and means operable responsively to operation of a fuse link in said one holder for effecting movement of said door relative to said holders and for effecting operation of said circuit-closing element to circuit-closing position.

10. In a circuit reclosing fuse unit adapted to be removably supported in an electric cutout casing, the combination of a cutout casing door, a fuse holder assembly movably attached to said door and including a plurality of fuse holders, means for connecting a fuse link in one of said holders in an electric circuit, a normally open switch operable to circuit-closing position for completing an electric connection through a fuse link in another of said holders, means for holding said door normally in substantially fixed relation to said assembly and arranged to be released by operation of a fuse link in said one holder, means operable upon release of said holding means for effecting relative movement between said door and said assembly, and means releasable by relative movement between said door and said assembly for effecting operation of said switch to circuit-closing position.

11. In a circuit-reclosing fuse unit adapted to be removably supported in an electric cutout casing, the combination of a cutout casing door, a fuse holder assembly movably attached to said door and including a plurality of fuse holders, means for connecting a fuse link in one of said holders in an electric circuit, a normally open switch operable to circuit-closing position for completing an electric connection through a fuse link in another of said holders, means for holding said door normally in substantially fixed relation to said assembly and arranged to be released by operation of a fuse link in said one holder, means operable upon release of said holding means for effecting movement of said door relative to said assembly, means releasable by movement of said door relative to said assembly for effecting operation of said switch to circuit-closing position, and timing mechanism connected for delaying the operation of said switch to circuit-closing position.

12. In a circuit-reclosing fuse unit adapted to be removably supported in an electric cutout casing, the combination of a fuse holder assembly including a plurality of fuse holders and common carrying means therefor, an electric cutout casing door movably attached to said assembly, spaced terminal means for engaging spaced stationary contacts, means for connecting a fuse link in one of said holders between said terminal means, a fuse terminal normally electrically isolated from one of said terminal means and arranged to connect with a fuse link in another of said holders, means for connecting a fuse link in said other holder between said terminal means including a switching element normally disposed in open-circuit position and operable to circuit-closing position for connecting said fuse terminal with said one terminal means, means releasable by operation of a fuse link in said one holder for effecting movement of said door relative to said assembly, means releasable by movement of the door for effecting operation of said switching element to circuit-closing position, and timing mechanism for controlling the operation of said last-mentioned means.

13. A unitary circuit reclosing device for removable installation on a supporting structure having spaced stationary contacts, said device comprising in combination a fuse holder assembly including a plurality of fuse holders and common carrying means therefor, means for connecting a fuse link in one of said holders between spaced stationary contacts, circuit reclosing mechanism associated with said assembly and forming part of said device, said mechanism including a contact element movable relative to said holders and operable responsively to operation of a fuse link in said one holder for establishing a circuit through a fuse link in another of said holders, means for mounting said assembly including a hinge lever pivotally connected with the assembly and adapted for hinged engagement with a supporting structure, and means for normally latching said lever in substantially fixed relation to said assembly, said latching means being releasable responsively to operation of a fuse link in said other holder to permit relative movement between said assembly and hinge lever.

14. In an electric cutout including a casing and spaced stationary contacts carried thereby, the combination of a plurality of fuse holders supported in said casing, a door movably mounted for closing an open side of the casing, means for connecting a fuse link in one of said holders between said contacts including a fuse terminal carried by said door and arranged to have attached thereto one end of a fuse link in said one holder for holding said door in rigid relation to said one holder, means for connecting a fuse link in another of said holders between said contacts including a movable switching element, means including a detent element carried by said door for normally latching said switching element in open-circuit position and arranged to release the switching element upon movement of the door relative to said one holder, means releasable by operation of a fuse link in said one holder for effecting movement of the door relative to said one holder, and means operable upon release of said switching element by said latching means for effecting movement of the switching element to circuit-closing position.

15. The combination with a fuse holder and a fuse cutout casing door, of means for removably securing said door to said holder including a pair of bosses mounted respectively on opposite sides of the holder and each having an inner portion of relatively large diameter and an outer portion of relatively smaller diameter, and a pair of arms carried by said door, spring biased relatively toward each other and arranged to receive said holder therebetween, each of said arms having an opening for receiving the larger diameter portion of one of said bosses and a communicating elongated slot of less width than said opening for receiving the smaller diameter portion of one of said bosses.

16. In combination, a fuse, a relatively fixed first detent, an electric switch including a contact element biased toward circuit closing position, means supporting said contact element for movement relative to said detent from a first position wherein the contact element is positively restrained in open circuit position by the detent to a second position wherein the contact element is disengaged from the detent for movement to circuit closing position, a relatively movably mounted second detent, means for latching said second detent in a position to hold said contact element in its said first position relative to said first detent, said latching means being releasable responsively to operation of said fuse, means operable upon release of said latching means for effecting movement of said contact element from its said first to its said second position relative to said first detent, and timing mechanism connected with said contact element for delaying movement of the latter to its said second position.

17. In combination, a slidably mounted member, a switch element movably mounted thereon and biased to a circuit-closing position, a detent, said member being slidable with respect to said detent from a first position wherein the detent engages said switching element to hold the latter in an open-circuit position to a second position wherein the switching element is disengaged from the detent for movement to circuit-closing position, latching means for holding said member in its said first position, means operable upon release of said latching means for urging said member toward its said second position, and time delay mechanism connected with said member for delaying movement of the member from its said first position to its said second position.

18. In combination, a cutout casing, stationary contacts carried thereby, a fuse supported in the casing connected between said contacts, a door movably mounted for closing the open side of the casing, a switch including a movable contact element, a detent arranged for locking engagement with said element to hold the element in an open-circuit position, said element and said detent being relatively movable, means for latching said element and said detent in locking engagement, said latching means being releasable by movement of said door relative to said fuse, means operable responsively to operation of said fuse for effecting movement of the door relative to said fuse, means operable upon release of said latching means for effecting relative movement between said element and said detent toward disengagement, timing mechanisms for delaying disengagement of said element and said detent, and means operable upon disengagement of said element from said detent for effecting movement of the element to circuit-closing position.

19. In a circuit reclosing fuse device for removable installation in a cutout or like casing, the combination of a fuse holder assembly including a plurality of fuse holders and common carrying means therefor, a door movably attached to said assembly and adapted to close an open side of a cutout or like casing, means for connecting a fuse link in one of the holders between stationary terminals, means including a contact operable to circuit closing position for connecting a fuse link in another of said holders between stationary terminals, a detent, means carried by said assembly supporting said contact and detent for relative movement, means for latching the contact and detent in locking engagement to restrain the contact in open circuit position and releasable by movement of said door relative to said assembly, means for holding the door normally in fixed relation to the assembly and releasable responsively to operation of a fuse link in said one holder for movement of the door relative to the assembly, means operable upon release of said latching means for effecting disengagement of said contact from said detent, timing mechanism for delaying disengagement of the contact from the detent, and means arranged to effect snap action movement of the contact from the detent.

20. In a circuit reclosing fuse device for removable installation on a supporting structure having spaced stationary terminals, the combination of a fuse assembly including a plurality of fuse holders and common carrying means therefor, means for connecting a fuse link in one of said holders between stationary terminals, a guide member carried by said assembly, a contact carrier slidably mounted on said guide member, a contact movably mounted on said carrier and biased for movement to a circuit closing position to complete connection of a fuse link in another of said holders between stationary terminals, a detent supported by said assembly, said carrier being slidable from a first position wherein said contact is held in an open position by said detent to a second position wherein the contact is released by the detent for snap action movement to closed position, means for latching said carrier in its said first position and arranged for release upon operation of a fuse link in said one holder, means for effecting movement of the carrier to its said second position upon release of said latching means, and means connected for delaying movement of the carrier to its said second position.

21. In an electric switching device, the combination of an elongated guide member, a contact carrier longitudinally slidable on said guide member, a contact pivotally mounted on said carrier and spring biased for snap action movement from an open circuit position to a closed circuit position, a detent supported adjacent said guide member for engagement by said contact, said carrier being slidable from a first position wherein said detent holds said contact in open position to a second position wherein the contact is released from the detent, means for latching said carrier in its said first position, means operable upon release of said latching means for effecting movement of the carrier to its said second position, and timing mechanism connected with the carrier for delaying movement thereof to its said second position.

LEROY P. SOHLES.

CERTIFICATE OF CORRECTION.

Patent No. 2,165,015. July 4, 1939.

LEROY P. SOHLES.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 8, for the word "expansion" read expulsion; line 9, before "the" first occurrence, insert of; line 19, for "ony" read only; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of August, A. D. 1939.

Leslie Frazer

(Seal) Acting Commissioner of Patents.