Dec. 29, 1936. R. S. BENNETT 2,066,172

FUSE CUT-OUT

Filed March 13, 1936

Fig. 1.

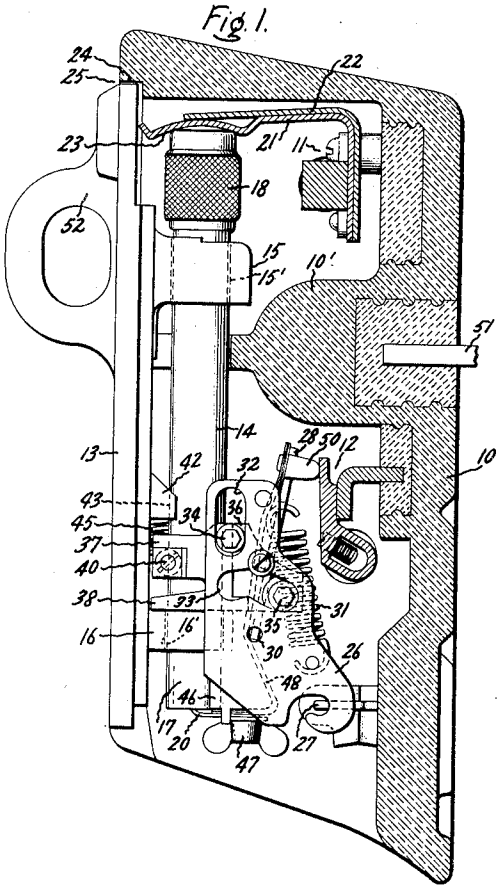
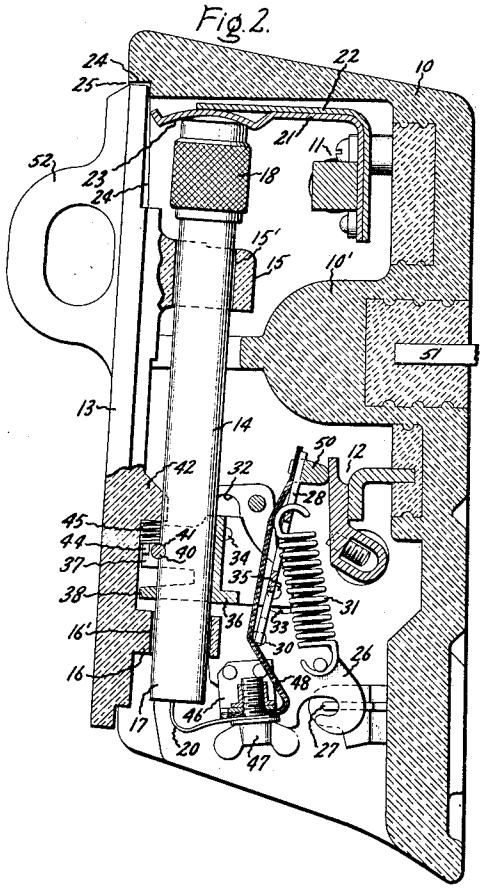


Fig. 2.



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FUSE CUT-OUT

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10 Claims. (Cl. 200—114)

The present invention relates to electric fuse cutouts and an object of the invention is the provision of an improved arrangement for mounting the fuse holder of an expulsion fuse in a cutout to prevent impairment of the operating parts and supporting structure of the cutout upon operation of the fuse.

A further object of the invention is to improve the structure of an enclosed fuse cutout of the type disclosed in the copending application of Benjamin R. Hermann, Serial No. 65,994, filed February 27, 1936, and assigned to the assignee of the present invention.

Other objects and the details of the construction and operation of an illustrative example of an enclosed fuse cutout embodying the present invention will become apparent from the following description taken in conjunction with the accompanying drawing in which Fig. 1 is a sectional side elevation of an enclosed fuse cutout showing the parts thereof in the positions they assume when the fuse unit is latched in its normal connected position and the fuse link is intact, and Fig. 2 is a sectional side elevation of the cutout showing the parts in the positions which they assume immediately after operation of the fuse.

Referring to the drawing, 10 designates a housing of porcelain or similar insulating material having an open front and bottom and formed with an electric creepage barrier 10' on its rear wall. A pair of stationary contacts 11 and 12 are mounted in the housing respectively on opposite sides of barrier 10' and are adapted to have line conductors fastened thereto. A removable cover 13 is provided for the open front of the housing and is arranged to be mounted on the fuse unit 14 of the cutout by means of projections or bosses 15 and 16 of insulating material formed integrally with the cover and having openings 15' and 16' of sufficient size to provide for the loose sliding of the fuse therein.

Fuse unit 14 is of the expulsion type and has an enclosing hollow tubular fuse holder 17 of insulating material open at the lower end for the discharge of gases therefrom and provided with a contact cap 18 secured to its upper end. The fuse unit has a fuse link (not shown) enclosed therein with the upper end of the link connected to contact cap 18 and the lower end connected to a conductor 20 extending out from the bottom of the fuse holder.

When the fuse unit 14 is in its normal connected position illustrated in Fig. 1, contact cap 18 is arranged to engage a contact finger 21 carried by the upper stationary contact 11 and is backed up by a spring strip 22 to provide the desired contact pressure. The contact finger is formed with a downwardly facing concave seat 23 which serves as a latch to prevent outward swinging of the upper end of the fuse. Also, when the fuse is in its normal connected position, cover 13, which is carried by the fuse holder 17, is arranged to close the open front of housing 10. As will be seen from the drawing, the front rim of the housing is provided with a flanged recess 24 into which the rim of the cover is arranged to seat, as indicated at 25, in sufficiently close cooperative relation with the housing to prevent the entrance of rain, snow and sleet to the interior of the housing and thus protect the parts of the cutout from damage by adverse weather conditions.

In the exemplary embodiment illustrated, fuse unit 14 and the cover 13 carried thereby are supported in the housing 10 by means of a toggle mechanism, one lever arm or element 26 of which is hingedly supported on hinge pins 27 carried by the housing, and the other arm or element 28 of which is pivotally connected to the element 26 as indicated at 30. A tension spring 31 is connected between the two arms 26 and 28 and tends to effect collapse of the toggle mechanism. The details of the construction of this supporting toggle mechanism, which form no part of the present invention, are fully set forth in the previously referred to copending application of Benjamin R. Hermann and hence there will be described herein only sufficient of the mechanism to insure a proper understanding of the present invention.

Toggle arm or element 26 is provided with slots 32 and 33 for the slidable engagement therewith of pins or studs 34 and 35, respectively, carried by a member 36 which is rigidly fastened to the fuse holder 17, thereby providing a pivotal and slidable connection between the fuse and the toggle mechanism. As best shown in Fig. 2, member 36 is formed with two arms 37 and 38 which have bores for the accommodation of the fuse holder. The rigid fastening of the member 36 to the fuse holder is effected by means of a screw 40 which engages openings in the arm 37 and is arranged to seat tightly in a groove 41 formed in one side of the fuse holder. Due to the loose fit of fuse holder 17 within the openings 15' and 16' of bosses 15 and 16 on the cover, arms 37 and 38 of member 36 are free to move to a limited extent between the boss 16 and a boss 42 formed integrally with the cover and having a groove 43 in which the fuse holder may slide. Arm 37 has a shoulder or abutment 44 and interposed between this shoulder and the boss 42 is a compression spring 45 which acts normally to maintain the cover in an elevated position with respect to the fuse holder and the housing so that boss 16 contacts with arm 38 and the top of the cover seats in a good weathertight manner in the upper portion of recess 24 as indicated at 25.

The hinged element or lever arm 26 of the fuse unit supporting toggle mechanism is provided

with a strap 46 and, as best shown in Fig. 1, the lower end of fuse holder 17 is latched normally in rigid engagement with the strap by means of conductor 20 which is securely clamped to the strap by means of a winged clamping screw 47. Clamping screw 47 serves also to maintain in tight engagement with the conductor 20 one end of a highly conductive flexible and resilient metallic strip 48, the other end of which strip is connected to a contact 50 carried by element 28 of the toggle. This strip serves to insure good electric connection between that contact 50 and the lower end of the fuse unit and to minimize current flow through spring 31 and the elements of the toggle mechanism.

To the back of the housing 10 there is secured a mounting bar, partially indicated at 51, for the attachment of the cutout to a suitable supporting structure, not shown. For manual operation of the cutout, cover 13 is provided with a handle 52 which may be grasped manually or engaged by a suitable form of switch stick to swing the fuse unit and door assembly inwardly and outwardly about the hinge pins 27.

When the cutout is closed, fuse unit 14 then being connected between fixed contacts 11 and 12 and door 13 closing the front of housing 10 as illustrated in Fig. 1, elements 26 and 28 of the supporting toggle mechanism are maintained in the extended relation shown by the pressure of contact 50 against the bearing surface of contact 12. Under these circumstances spring 31 tends to effect collapse of the toggle mechanism as fully described in the previously referred to Hermann application, to cause outward movement of the fuse unit and door assembly. However, the combined action of seat 23 and resilient backing strip 22 serves to latch contact cap 18 in engagement with contact finger 21 and to prevent the upper end of this assembly from swinging outwardly about hinge pins 27, while the toggle mechanism and the lower end of the fuse unit and door assembly are latched by means of conductor 20 and clamping screw 47. The lower latch remains operative as long as the fuse link remains intact and the fuse unit is maintained thereby in its inward position connected between fixed contacts 11 and 12, the connection at the upper end being through contact finger 21 to contact cap 18 and at the lower end through contact 50 and strip 48 to conductor 20. While the fuse unit is in this connected position, cover 13 effectively closes the front of housing 10, as previously pointed out, to prevent the entrance of rain, sleet and snow to the interior of the housing. If it is desired to open the cutout while the fuse link remains intact, this may be done by grasping the handle 52 on the cover, either manually or by means of a suitable switch stick, and pulling outwardly with sufficient force to disengage contact cap 18 from seat 23 of contact finger 21. The fuse holder, door and toggle assembly can then be swung outwardly and downwardly as a unit to a position at which the fuse unit is disconnected from the stationary contacts.

On the other hand, operation of fuse unit 14, when it is in its normal connected position shown in Fig. 1, results in automatic operation of the cutout. Only sufficient of the operation as is necessary for a full understanding of the present invention will be given herein, and reference may be had, if desired, to the previously identified Hermann application for the details of the complete automatic operation. The first step in the operation of the cutout is the expulsion from the lower end of the hollow tubular fuse holder 17 of conductor 20 along with the gases generated in the holder due to fusing of the fuse link. This releases the toggle latching arrangement at the lower end of the fuse holder so that the toggle mechanism can become effective to operate the cutout. At the same time, the downwardly directed expulsion action of the fuse unit produces a violent upwardly directed recoil of the fuse holder since there is present usually some slack in the various connections of the parts of the fuse supporting mechanism. In previous constructions wherein the door has been mounted on the fuse holder with little or no provision made for relative movement between the fuse holder and the door, this recoil of the fuse holder, though partially absorbed by the fuse supporting structure and by the upper contact backing strip, still has been transmitted to the door to a sufficient extent to produce a violent upward movement of the door. As a result of this violent upward movement the upper rim of the door frequently strikes the front of the porcelain housing with sufficient force to cause chipping or complete breaking of the door or the housing or both. An expedient for preventing such damage has been to provide a wide clearance between the door and the housing at the point designated 25 on the drawing. Under certain weather conditions, this wide clearance has permitted the entrance of rain, sleet and snow into the housing. In the cutout constructed in accordance with my present invention, the normal action of spring 45 maintains the upper rim of the door in a relatively close weathertight relation with respect to the wall of recess 24 so that it is impossible for rain, sleet and snow to enter the housing to impair the parts of the cutout, while my improved arrangement for mounting the door on the fuse holder prevents chipping or shattering of the porcelain of the door and housing upon operation of the fuse unit. When the fuse link blows and the fuse holder recoils, the cushioning action of spring 45 permits relative motion between the fuse holder and the door so that insufficient of the force of the recoil is transmitted to the door to cause damage to the housing or to the door itself. Furthermore, the cushioning action of the spring in combination with the inertia of the door produces a shock absorbing effect which tends to relieve the fuse holder supporting structure of some of the shock of the recoil. The positions of the parts of the cutout immediately subsequent to rupture of the fuse link are illustrated in Fig. 2 wherein the fuse holder is shown as having moved upwardly in the loose fitting openings 15' and 16' of the bosses 15 and 16, respectively, of the cover, and arm 38 is shown as having moved away from the boss 16 while spring 45 is shown as being compressed between the shoulder 44 of arm 37 and the lower face of the boss 42.

From the foregoing description, it will be evident that my improved arrangement for mounting the door of the enclosed cutout on the fuse holder makes it possible to adequately protect the parts of the cutout from all sorts of adverse weather conditions and at the same time protects the housing and door from damage due to operation of the fuse unit. And, although my invention has been described and illustrated as incorporated in only one illustrative embodiment of an enclosed fuse cutout, it will be understood that, where conditions render it advantageous to do so, the details of the invention may be suit-

ably modified for incorporation in other forms of fuse cutouts without departing from the true spirit and scope of the invention as defined in the appended claims.

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 housing having an opening in a side thereof and having a movable door for closing the opening to protect the interior of the housing from adverse weather conditions, an expulsion fuse unit mounted and electrically connected within the housing, and means supporting the door on said fuse unit with the rim of the door in closely cooperative substantially weathertight relation with respect to the rim of said opening and operative upon recoil of the fuse unit incident to fuse operation for minimizing the transmission of shock through the door to the rim of the housing opening.

2. In an electric cutout, the combination of a housing having an opening, in a side thereof, a door for closing the opening to protect the interior of the housing from adverse weather conditions, an expulsion fuse unit mounted and electrically connected within the housing, means for supporting the door on the fuse unit with the rim of the door in relatively close relation to the rim of the housing, and shock absorbing means operative to minimize the transmission of the recoil force from the fuse unit to the door upon operation of the fuse unit.

3. In an electric cutout, the combination of a housing having an opening in a side thereof, an expulsion fuse unit, means for mounting and electrically connecting the fuse unit within the housing, a door for closing said opening to protect the interior of the housing from adverse weather conditions, and means for movably mounting the door on the fuse unit with the rim of the door in cooperative weathertight relation with respect to the rim of said opening including a shock absorbing device operatively connected between the door and fuse unit for minimizing the transmission to the door of the recoil force of the fuse unit incident to fuse operation to thereby prevent damaging impact of the door against the rim of the housing opening.

4. In an electric cutout, the combination of a housing having an open side, a door for closing said open side, an expulsion fuse unit mounted and electrically connected in the housing, means for supporting the door on the fuse unit with the rim of the door in relatively close engagement with the rim of said open side of the housing, and shock absorbing means operative to prevent damaging impact of the door rim against the rim of the housing upon recoil of the fuse unit incident to fuse operation.

5. In an electric cutout, the combination of a housing having an open side and a flanged recess extending around the rim of the top and at least a portion of the sides of said open side, an expulsion fuse unit mounted and electrically connected in the housing and having a downwardly directed gas discharge opening, a door arranged to seat in said flanged recess to close the opening, and means for supporting the door on the fuse unit operative normally for maintaining the top edge of the door substantially in engagement with the top wall of said flanged recess and operative upon recoil of the fuse unit incident to fuse operation for preventing damaging impact of the door against said top wall of the flanged recess.

6. In an enclosed fuse cutout, the combination of a housing having an opening in a side thereof, spaced contacts mounted in the housing, an expulsion fuse unit, means for supporting the fuse unit in the housing connected between the contacts, a door, means for mounting the door slidably on fuse unit in position to close said opening when the fuse unit is in connected position, a boss rigidly carried by the door, a second boss rigidly carried by the fuse unit and a spring operatively connected between said two bosses for minimizing the transmission to the door of the recoil of the fuse unit upon fuse operation.

7. In an electric cutout, the combination of a housing having an open side, an expulsion fuse unit mounted and electrically connected within the housing, a door for closing said open side, means for mounting the door on the fuse unit including bosses carried by the door and having openings for the relatively loose slidable accommodation of the fuse unit, means providing an abutment rigidly carried by the door, means providing an abutment rigidly carried by the fuse unit and a spring operatively disposed between said abutments for maintaining the top of said door in relatively close engagement with the top rim of said opening, said spring being effective upon fuse operation to minimize the transmission to the door of the force of the fuse unit recoil.

8. In an electric cutout, the combination of a housing having an opening in a side thereof with a flanged recess extending around the rim of the opening, spaced contacts mounted in the housing, an expulsion fuse unit having a gas discharge opening in one end thereof, means for supporting the fuse unit in the housing connected between the contacts with said discharge opening directed downwardly, a door for closing said housing opening, means for slidably mounting the door on the fuse unit with the rim of the door seated in said flanged recess of the housing, and spring means operatively connected between the door and fuse unit for maintaining the top of the door in substantially weathertight relation with respect to the top portion of said flanged recess, said spring being operative also upon recoil of the fuse unit incident to fuse operation for absorbing at least part of the force of such recoil and preventing damaging impact between the top of the door and the housing.

9. In an electric cutout, the combination of spaced contacts, an expulsion fuse unit, means for supporting the fuse unit connected between the contacts, and an inertia element movably and resiliently mounted on the fuse unit for absorbing at least part of the shock of the fuse unit recoil incident to fuse operation to thereby minimize the strain to which said supporting means is subjected due to such recoil.

10. In an electric cutout, the combination of spaced contacts, an expulsion fuse unit, means for connecting the fuse unit between the contacts, means for supporting the fuse unit removably in a connected position, an element mounted slidably on the fuse unit and a spring connected between said element and the fuse unit to provide a cushioning action therebetween upon recoil of the fuse unit incident to fuse operation, said element having sufficient inertia upon recoil of the fuse unit to cause said spring to act as a shock absorber to relieve said fuse supporting means of a portion of the shock of such recoil.

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