Feb. 6, 1934. F. HARVEY 1,946,071

ELECTRIC CUT-OUT

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Fig. 1.

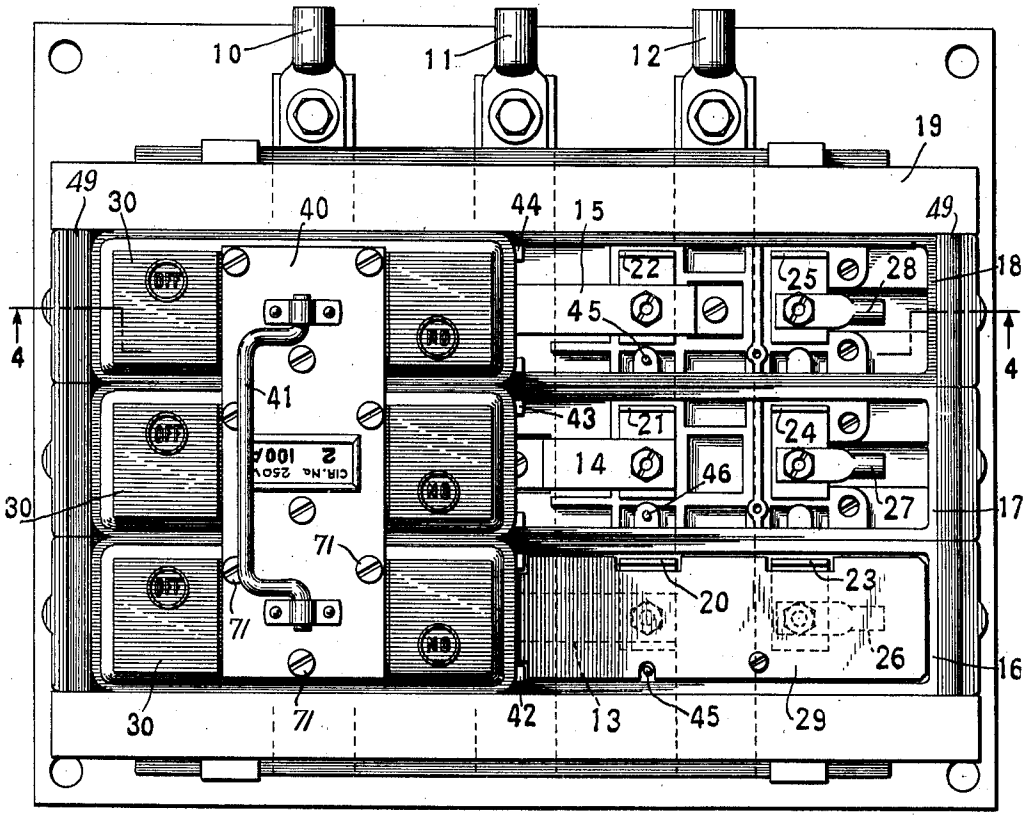

Fig. 2.

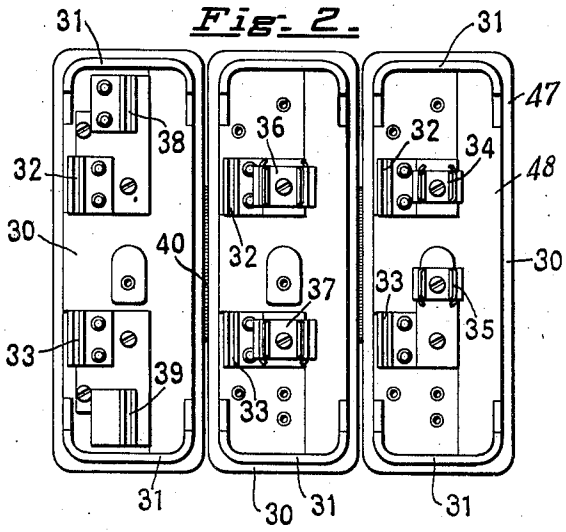

Fig. 3.

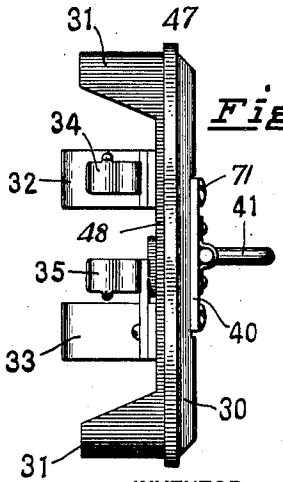

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Fig. 4.

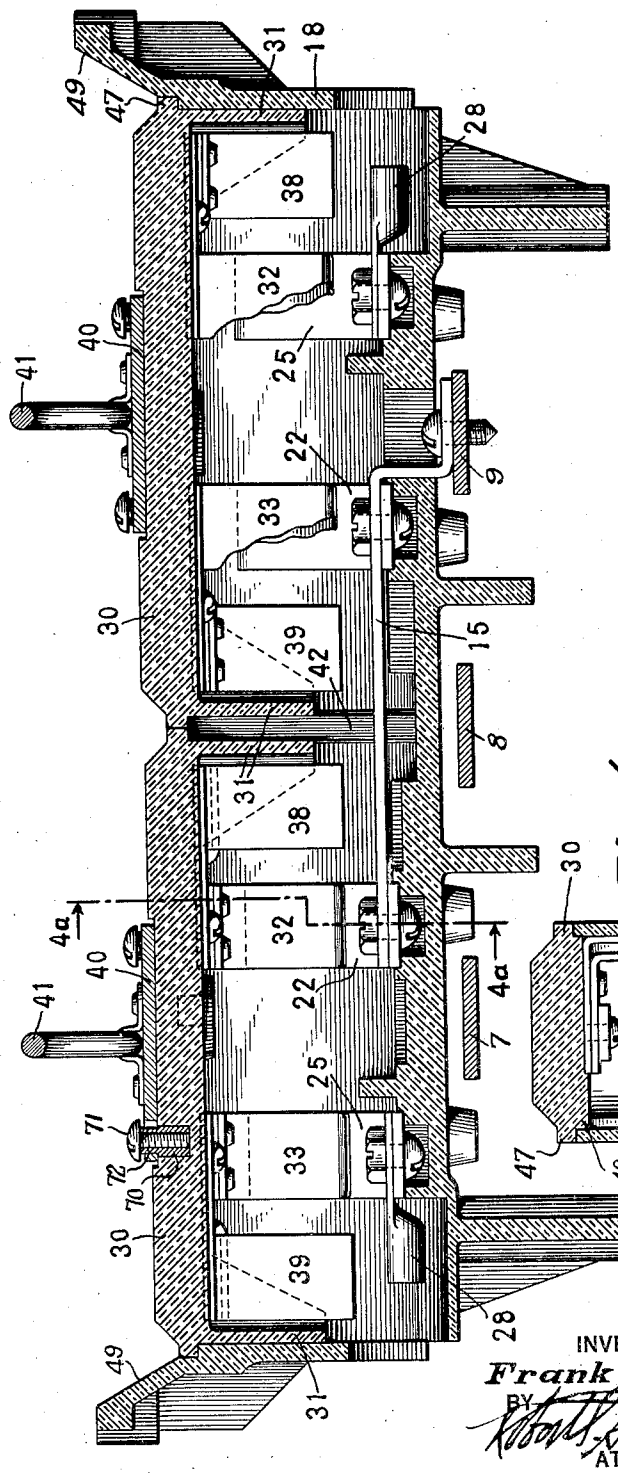
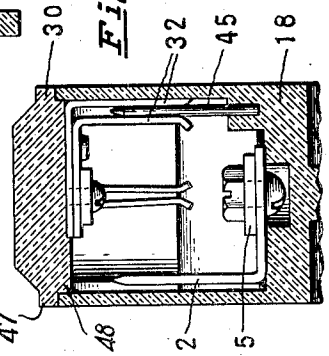


Fig. 4a.



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ELECTRIC CUT-OUT

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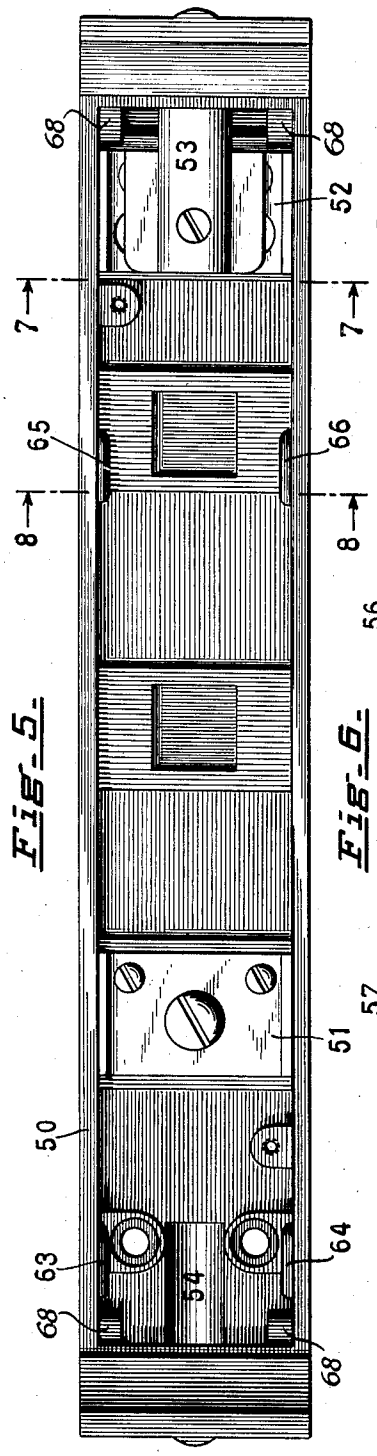

Fig. 5.

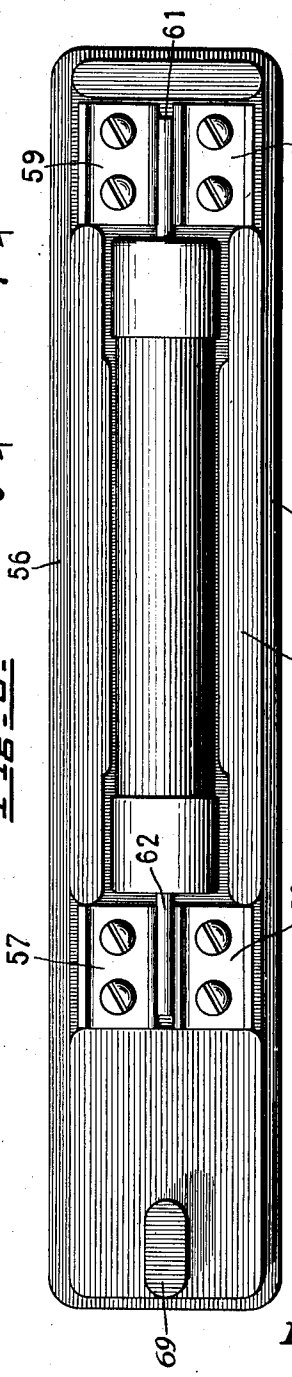

Fig. 6.

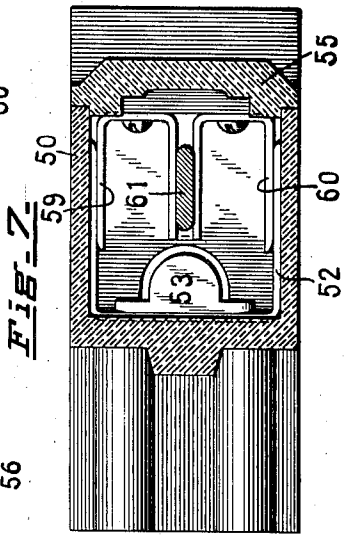

Fig. 7.

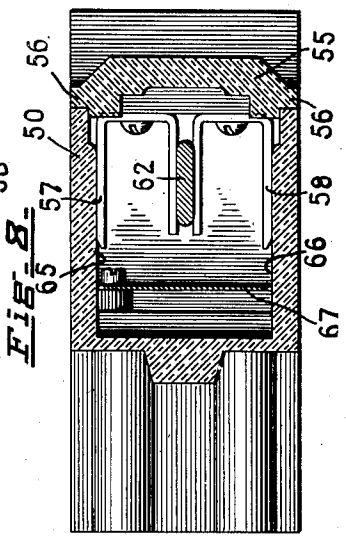

Fig. 8.

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UNITED STATES PATENT OFFICE

1,946,071

ELECTRIC CUT-OUT

Frank Harvey, Covington, Ky., assignor to The Trumbull Electric Manufacturing Company, Plainville, Conn., a corporation of Connecticut

Application December 24, 1930
Serial No. 504,445

20 Claims. (Cl. 200—114)

My invention relates to electric cut outs of the panel board type and is especially adapted for use in connection with fuses of the enclosed type.

In many instances, in actual practice it is not necessary to provide a separate circuit controlling switch in direct connection with each branch circuit or in the immediate vicinity of the device to be controlled provided means are available for safely disconnecting the circuit if so desired, or for readily disconnecting the fuse carrier from the panel or receptacle in the operation of removing, replacing or inspecting the fuses.

It is desirable in this class of cut outs to provide a fuse carrier which may be entirely removed from connection with the main circuit contacts in disconnecting the branch circuit and which may be reversed, or turned end for end, and then be re-inserted in the reversed position in the receptacle or panel and securely retained in this electrically disconnected position.

In many instances where it is necessary to provide means for disconnecting the branch circuits, there is not sufficient space to allow for the installation of a separate switch for each branch circuit, also the cost of such an installation would be comparatively great and to meet such conditions I have found it practical to employ the combination of a bus-connected panel or cut out enclosure and a readily detachable and reversible fuse-carrier, the carrier being so designed that, as a unit, it may be operated in a manner similar to that of a knife blade switch and thus save the cost of such a switch as well as the space required for such a switch.

My invention is particularly adapted for use in a three-wire double branch circuit but, in its broader aspect, it may be applied to a single branch circuit or to a circuit having a greater or lesser number of feed wires or buses.

One object of my invention is to provide a cut out enclosure or receptacle having a fuse carrier which may be readily removed and entirely disconnected from the receptacle for the purpose of safely manipulating the fuses.

Another object is to provide a cut out receptacle having a readily removable fuse carrier which may be reversed, end for end, and re-inserted in the receptacle in non-conducting position and so arranged that it will entirely enclose and protect all live conducting parts in either of its positions and which will visibly indicate its "on" and "off" positions.

Another object is to provide a readily detachable fuse carrier having contacts for engagement with corresponding contacts mounted in the receptacle with an arcuate, wiping movement in a manner similar to that of the blades of a knife switch.

Another object is to provide a panel cut out or receptacle having a detachable multiple fuse carrier in which a separately mounted and independently adjustable fuse unit is employed for each pole of the circuit to be controlled.

Another object is to provide a multiple fuse carrier in which all of the fuse units are secured to a common handle plate with sufficient freedom of motion, relative to each other and to the handle plate, to allow for a considerable independent alignment of the contacts carried by each unit.

Another object is to provide a cut out construction having a fuse carrier which may be reversed, end for end, and means entirely free of the circuit for securing the carrier in reversed position in the receptacle with all of the fuses and conducting parts of the carrier entirely disconnected from the circuit.

Another object is to provide a double-branch panel cut out having a separate fuse carrier for each of the branch circuits and so arranged that either of the branch circuits may be connected or disconnected from the circuit independently of the other branch circuit.

Another object is to provide a fusible cut out construction in which an unusually adequate amount of air space is provided in each of the fuse units.

Another object is to provide a cut out construction in which the receptacle is made of molded material having sufficient inherent yielding or spring qualities to allow for its use as a means for holding the fuse carrier in one of its positions in the receptacle.

Another object is to provide a cut out construction of the foregoing descriptions which may be made at a minimum cost and which provides for a maximum of safety and efficiency in operation.

Another object is to provide a practical cut out construction in which fuse and switching means are combined so as to occupy a minimum of space.

Fig. 1 is a front view of one form of construction embodying my invention employing three units arranged in a three wire system, one set of fuse carriers being omitted and the other set in place in the off or open circuit position.

Fig. 2 is a rear view of one set of fuse carriers each carrier being adapted for a different capacity fuse.

Fig. 3 is a side view of one of the fuse carriers. The fuses are not shown in Figs. 1, 2 or 3.

Fig. 4 is a horizontal section on the plane of the line 4—4 of Fig. 1 but on a larger scale. The left hand fuse carrier shows the parts in the closed circuit position and the right hand fuse carrier shows the parts in the open circuit position.

Fig. 4A is a transverse sectional view of one of the units showing the parts in their assembled relation in the open circuit position.

Fig. 5 is a front view of a single base unit of a larger type showing the stationary contacts but with the fuse carrier removed.

Fig. 6 is a rear view of the fuse carrier adapted to be inserted into the receptacle of Fig. 5.

Fig. 7 is a section on the plane of the line 7—7 of Fig. 5 showing the fuse carrier in place in the closed circuit or on position.

Fig. 8 is a transverse section on the plane of the line 8—8 of Fig. 5 showing the contacts in the off or open circuit position.

The main circuit terminals 10, 11 and 12 are electrically connected in any suitable manner, for instance by bus bars 7, 8 and 9 located in the rear to the inner cross bars such as 13, 14 and 15 respectively, which are located within the housings or receptacles 16, 17 and 18 respectively. These receptacles are preferably formed of molded insulation and mounted within a suitable frame or panel 19 as is customary in such construction. Each receptacle has on each side of the center of the panel a stationary contact such as 20, 21 and 22, connected to the cross bars and bus bars above mentioned. The branch connections are effected through stationary contact blades 23, 24 and 25 which have terminals 26, 27 and 28 as shown in Fig. 1 to which the branch conductors are connected in the usual manner. The cross bars and branch terminals may be covered if desired by insulating strips such as 29 suitably secured in the individual receptacles.

Each fuse carrier is preferably formed of molded insulation having a top 30 with end flanges such as 31. Contact jaws such as 32 and 33 are suitably secured to the carrier and adapted to engage a pair of the stationary contacts such as 22 and 25. Fuse clips such as 34 and 35 are connected to the contact jaws 32 and 33 spaced apart and of the proper size to receive the proper fuse for the particular branch circuit which is to be supplied. Clips 34 and 35 are adapted to receive a small size cartridge type fuse whereas clips 36 and 37 in Fig. 2 would be adapted to receive a larger size cartridge type fuse and the jaws 38 and 39 would accommodate the knife blade terminals of a still larger type of fuse.

I preferably loosely connect all of the fuse carriers of one side of the apparatus by means of a plate such as 40 provided with a swinging handle 41, for convenience in handling the assembled carrier unit. These fuse carriers are provided with indicating devices such as the words "On" and "Off" to convey to the inspector or user the necessary information as to the position of the branch circuit connections. For instance, in Fig. 1, the word "Off" is visible in an upright position indicating that that side is off or out of circuit. The three fuse carriers may all be pulled out simultaneously by the handle 41 and turned around end for end so that the word "On" will be read properly right side up. The fuse carriers then being inserted into the respective receptacles, the contact jaws 32, 33 and so forth, will respectively engage the stationary contacts 22 and 25 and so forth, and connect all of the branch conductors on that side to the main line conductors. The lugs 42, 43 and 44 within the contact receptacles serve to assist in locating the sets of fuse carriers in the respective compartments.

To hold the fuse carriers in place in the off position I provide a series of studs or pins such as 45 and 46 which are adapted to fit into the jaws such as 32 and 33 when the fuse carriers are inserted into the housings or receptacles. These pins are located symmetrically with respect to the stationary contacts in the housings but of course are not connected to any circuit. In this case the split jaws 32 and 33 and so forth serve as a yielding means for holding the fuse carriers in place in the off or open circuit position.

The flange 47 of the front plate overlaps the front edges of the housing or receptacle 16, 17 etc. and the wall or shoulder 48 fits inside so as to assist in positioning the parts. The end flanges 49 facilitate the insertion of the fuse carriers.

In the constructions shown in Figs. 5, 6, 7 and 8 a receptacle 50 of insulating material is provided with a U-shaped main contact 51 adapted to be connected to a main bus bar (not shown) at the back. Another U-shaped contact 52 has a branch circuit terminal 53 adjacent one end for convenience in wiring and replacement. These receptacles may be double-ended and provided with recesses for the respective contacts at both ends so that, for instance, a contact like 52 could be seated in the recess 54. The fuse carrier has the main face plate 55 with flanges 56 adapted to rest on the outside edges of the receptacle 50. This front plate or carrier supports two U-shaped contacts at each end arranged in pairs 57, 58, 59 and 60. The outer arms of these contact members are adapted to frictionally engage the projecting arms of the stationary contacts 51 and 52 when the fuse carrier is inserted in the receptacle in the on position. The fuse itself in these cases is shown as of the cartridge type with blade terminals 61 and 62 adapted to fit the holders formed by the adjacent arms of the contact members 59 and 60 and 57 and 58 respectively as shown in Figs. 6, 7, and 8.

By removing the fuse carrier and turning it around end for end and again inserting the contact blades into the housing or receptacle 50, the contacts 59 and 60 respectively will engage the bosses 63 and 64 in the housing and the contacts 57 and 58 will be yieldingly engaged by the bosses 65 and 66, so that the fuse carrier will be resiliently held in the housing by the engagement of the contacts with the bosses on the yielding sides of the housing.

In the reversed position the contacts 59 and 60 will yield for engagement with the bosses 63 and 64. Contacts 57 and 58 will also yield for engagement with bosses 65 and 66 and the resiliency of the side walls of the receptacle adjacent the bosses will add materially to the yielding engagement of the fuse carrier and the receptacle at these points.

A cover plate 67 may be mounted in the receptacle 50 if desired to cover up the base of the contacts and connectors and thus lessen the danger of accidental contact or short circuiting when the fuse carrier is removed.

The loose connection between the fuse carriers of a given group may be effected in any suitable manner as for instance by screw seats such as 70 (Fig. 4) molded or otherwise set in the face plate

30 and screws 71. These seats have necks 72 a little longer than the thickness of the connecting handle plate 40 and the holes for the necks are a little larger so that there is a little play which permits the individual fuse carriers to separate as shown in Fig. 2. When the fuse carriers are inserted into the terminal receptacles the contacts are able to adjust or aline themselves more readily. In fact the carriers may be drawn together as shown in Fig. 1.

In the form shown in Figs. 5 to 8 the corners of the housing have projections 68, 68 which serve to guide the end corners of the outer contact blades 59 and 60 when the fuse carrier is being inserted. The projection 69 on the carrier coacts with the end walls of the housing in positioning the fuse carrier when inserting it.

It will be seen that the construction as herein shown and described is exceedingly simple and yet rugged. When the circuit is in the closed or on condition all of the live parts are completely covered and notice is given by the indications on the face plates of the fuse carriers that the circuit is "on". When it is desired to disconnect either one of the branch circuits it is simply necessary to pull out the fuse carrier on that side, turn it around, end for end, and reinsert the carrier whereupon all the live parts are entirely enclosed and notice is given that the fuses are in the disconnected or "off" position.

It will be seen that each branch is provided with its individual fuse which can be individually inserted, removed, adjusted or replaced.

I claim:

1. An electric cut out of the panel board type including a plurality of insulating housings each having stationary contacts and circuit terminals mounted therein, a plurality of fuse carriers loosely secured to a common carrier plate and each carrier being provided with a pair of contacts adapted to engage a cooperating pair of stationary contacts in one of the respective housings, said plate and said fuse carriers being removable together as a unit and said housings being provided with means for yieldingly holding said unit in place when turned end for end and re-inserted in said housing.

2. An electrical cut out including an insulating housing having side and end walls, stationary contacts adjacent to one of the side walls of said housing and said housing having a non-conducting projecting holding member symmetrically arranged with respect to each of said stationary contacts and adjacent another side wall of said housing, a fuse carrier having yielding contacts for engagement with said stationary contacts in one of its positions and adapted to be turned around end for end, so that the yielding contacts in the carrier engage the stationary holding members in the housing to secure the carrier in position.

3. In an electric cut out, an insulating receptacle having two stationary contacts secured therein and spaced apart from each other and positioned in tandem relation adjacent to one of the side walls of the receptacle and a readily detachable fuse carrier comprising an insulating body and having contacts secured to the body in tandem relation adjacent to one of its side edges and adapted to engage the contacts in the receptacle when the fuse carrier is in one position, a cartridge type fuse arranged centrally of the carrier at one side of the contacts, said fuse carrier being adapted to be turned around end for end, and inserted into the housing with the fuse and frictionally held therein with the contacts of the carrier disconnected from the contacts in the receptacle.

4. The combination in a panel fuse cut out, of a plurality of rectangular insulating receptacles, electrical contacts in said receptacles, a plurality of rectangular insulating cover members for completely closing said receptacles, electrical contacts and fuse terminals on said cover members, all of said contacts being parallel to the length of the receptacles and cover members, the contacts on said cover members being engageable with the contacts in said receptacle by a sliding movement for completing electrical circuits some of the contacts in the receptacles and some of the contacts carried by the cover members being offset from the center of the receptacles and cover members respectively and said cover members being reversible and engageable with said receptacles when reversed, end for end, to disrupt the circuit, the length and width dimensions of said cover members being so proportioned with respect to the said receptacles as to form a sectional dead front cover for said receptacles for completely housing all of the circuit conducting members of said cover members and said receptacles when some or all of the said cover members are in the on position and also when some or all of said cover members are in the off position.

5. A cut out comprising an insulating housing having a chamber with blade-like contacts secured in the bottom of the housing and projecting therefrom close to one side of the housing and spaced apart longitudinally of the housing, a removable and reversible fuse carrier insertable into said chamber of said housing and comprising an insulating front plate having end guide flanges, fuse clips secured to the rear of the plate adjacent said flanges and adapted to hold a cartridge type fuse lengthwise of the plate, contact members secured to the back of the plate and to the respective fuse clips at one side only of the plate to coact with the contacts in the housing when the fuse carrier is inserted in the on position in the housing, and means for holding the fuse carrier frictionally in the housing without electrical connection between the contacts when the fuse carrier is inserted in the reversed off position and a handle on the front of the fuse carrier to permit handling the carrier in either the on or off position.

6. An electric cut out construction including a plurality of discrete receptacles, each receptacle having pertinent stationary contacts and terminals secured thereto, an equal number of discrete detachable fuse carriers, each carrier having fuse terminals and co-related contacts secured thereto for engagement with the respective stationary contacts in said receptacles and a common handle plate for said fuse carriers, each of said fuse carriers being loosely secured to said handle plate and having a limited free movement with respect to each other and to said plate to permit self adjustment of the contacts of the carriers with respect to the corresponding contacts in said receptacles.

7. An electric cut out construction including a plurality of insulating receptacles each of said receptacles being provided with pertinent terminals and stationary contacts, a plurality of fuse carriers each comprising an insulating body having fuse terminals and contacts mounted thereon for engagement with the stationary contacts in said receptacle and a common handle plate for said fuse carriers, the said fuse carriers being

spaced slightly apart from each other and loosely secured to said handle plate with a limited free movement with respect to each other and to said plate to permit self adjustment of the contacts of each fuse carrier with respect to the stationary contacts of its co-related receptacle.

8. An electric panel board construction including a plurality of insulating receptacles, pertinent contacts and terminals mounted in said receptacles, a plurality of insulating covers for said receptacles, fuse terminals and contacts rigidly mounted on said covers for engagement with the contacts in said receptacles, a single handle plate for all of said covers, said covers being permanently secured to said plate with sufficient freedom of movement with respect to each other and to said plate to permit independent adjustment of the contacts mounted on each cover with respect to the contacts mounted in the respective receptacles.

9. An electric panel board unit including a receptacle of insulating material and having resilient side walls, pertinent contacts and terminals mounted in said receptacle, an insulating cover for said receptacle, fuse terminals and contacts mounted on said cover for engagement with the contacts in said receptacle, said cover contacts having projecting resilient portions for engagement with the resilient side walls of said receptacle to retain said cover in the off position.

10. An electric panel board unit including a receptacle of insulating material and having resilient side walls, pertinent contacts and terminals mounted in said receptacle, an insulating cover for said receptacle, fuse terminals and contacts mounted on said cover for engagement with the contacts in said receptacle when the cover is in the on position and said cover contacts having projecting portions for engagement with the resilient side walls of said receptacle to retain said cover in position when said cover is turned end for end to the off position.

11. An electric panel board unit including a box-like receptacle of insulating material and having resilient side walls, pertinent contacts and terminals mounted in said receptacle, an insulating cover for said receptacle, fuse terminals and contacts mounted on said cover for engagement with the contacts in said receptacle in one position of the cover, the contacts on said cover having projecting portions for engagement with the resilient side walls of said receptacle to secure said cover in position when said cover is attached to said receptacle in another position.

12. An electric panel board unit including an insulating base, two contacts mounted on said base, spaced away from the median line of said base and apart from each other, an insulating cover for said base, two contact jaws mounted on said cover and spaced in register with the contacts on said base and two independent pin members mounted on said base and spaced oppositely and symmetrically with respect to the contacts on said base, the contact jaws on said cover being adapted to engage the contacts on said base when the cover is in one position and to engage the pins on said base when the cover is turned around end for end.

13. An electric cut-out including an insulating housing of channel-like form open at the front and having electric terminals at the rear, two stationary contact plates connected to said terminals nearer to one wall of the housing than to the opposite wall, a removable and reversible fuse carrier having a front plate and positioning flanges formed of insulating material and adapted to close the opening in the front of the housing, a handle at the front of said plate, two contact blades projecting from the rear of the front plate to coact with the stationary contact plates when the fuse carrier is inserted in the on position and fuse clips carried by the rear of said front plate and electrically connected to the respective blades of the fuse carrier, said clips being constructed and arranged to support the ends of a cartridge type fuse within the housing alongside of the contact plates.

14. A cut-out including a housing having a chamber open at the front, plate-like contacts secured in said housing and projecting close to one wall of the housing and spaced apart longitudinally of the housing, a removable and reversible fuse carrier insertable into the front of said chamber and comprising an insulating front plate having positioning guide flanges, fuse holders secured to the rear of the plate and adapted to hold the ends of a cartridge type fuse lengthwise of the plate, contact blades secured to the back of the front plate and electrically connected to the respective fuse holders at one side of the front plate to coact with the contacts in the housing when the fuse carrier is inserted in the "on" position in the housing and means for holding the fuse carrier in the housing without electrical connection between the contacts when the fuse carrier is inserted in the "off" position and a handle on the front of the fuse carrier to permit handling and reversing the carrier to insert it in either the on or off position.

15. An electric cut-out including an insulating housing of channel-like form having a longitudinal channel open at the front, two circuit terminals at the rear of said housing, two contact plates mounted in the housing and connected to the respective terminals and having contact surfaces parallel with the length of the housing, a removable and reversible fuse carrier having an insulating front plate with a flange overlapping the edges of the opening in the front of the housing and having positioning projections fitting the walls of the chamber in the housing, resilient contact blades carried by the rear of the front plate for coacting with the contact surfaces of the contact plates in the housing when the carrier is inserted in the on position, a fuse holder connected to each contact blade for holding a cartridge type fuse lengthwise of the carrier in the housing and means in the housing for engaging the contact blades of the fuse carrier to hold the carrier in place when it is reversed and inserted in the off position and a handle on the front of the carrier for handling the carrier and inserting it in the on and off positions.

16. An electric cut-out including an insulating housing with a chamber open at the front, a pair of connected contact members mounted in one end of the housing, a second pair of connected contact members mounted in the housing spaced apart longitudinally of the housing from the first mentioned pair but at a greater distance from the opposite end than the distance between the first pair and its end of the housing, a removable and reversible fuse carrier of insulating material having a front plate for overlapping the edges of the opening in the housing, two pairs of contact blades carried by the

rear of the front plate in position for coacting with the respective contact members in the housing when the fuse carrier is inserted in the on position, fuse holders for holding the ends of a cartridge type fuse, each fuse holder being mounted between the contact blades of a pair of blades at the rear of the plate and means in the housing for automatically holding the fuse carrier in place when reversed and inserted in the off position.

17. An electric cut-out including a housing having a chamber containing two U-shaped contact terminal members one of which is mounted near one end of the housing and the other of which is mounted at a greater distance from the other end of the housing, each of said members having spaced apart contact arms, a reversible fuse carrier having a face plate serving to close the front of the chamber, two pairs of U-shaped contact members secured to the rear of the carrier, each pair having resilient blades adapted to receive the terminals of a cartridge type fuse and also having resilient blades adapted to engage the arms of a contact terminal member when the fuse carrier is inserted in the on position, said contact members being so located that when the carrier is reversed the circuit is open.

18. A cut-out including a housing having a pair of connected contact plates mounted at the opposite sides close to one end of the housing and a second pair of connected contact plates mounted on opposite sides in the housing at a relatively greater distance from the opposite end of the housing, a removable and reversible fuse carrier insertable into said housing and having an insulating front plate, fuse holders secured to the rear of said front plate and adapted to hold a cartridge type fuse lengthwise of the plate, resilient contact blades secured to said plate and electrically connected to the respective fuse holders and adapted to coact with corresponding contacts in the housing when the fuse carrier is inserted in the on position, said housing having shoulders to engage the contact blades when the fuse carrier is reversed and inserted in the housing in the off position, said fuse carrier having a handle at the front to permit handling the carrier to insert it in the on or off position.

19. An electric cut-out including an insulating housing having a fuse chamber and at least two contact plates at one side of the chamber spaced apart from each other longitudinally of the housing and with their contact faces arranged parallel with the length of the housing and a fuse carrier having a front plate adapted to entirely cover the chamber in the housing, fuse holders secured to opposite ends of said front plate and adapted to support a cartridge type fuse arranged longitudinally of the front plate, contact blades mechanically supported by the front plate and electrically connected to the respective fuse holders and extending rearwardly from the front plate and resiliently yieldable laterally with respect to the length of the front plate and adapted to coact with the contact plates in the housing when the fuse carrier is inserted in the on position, the respective contact plates in the housing being arranged nearer to one wall of the housing than to the opposite wall of the housing and the contact blades carried by the front plate being correspondingly arranged so that by reversing the fuse carrier the contact blades of the fuse carrier may be inserted in the off position and means carried by the housing for coacting with the blades of the fuse carrier for frictionally holding the fuse carrier in the off position.

20. A cut-out including an insulating housing having a plate-like contact member near one end at one side thereof and having a projection at the opposite side near the opposite end of the housing, said housing having guide shoulders in the corners of the housing leading to the adjacent corner of a contact member and to the projection respectively, a second plate-like contact member mounted in the housing at the same side of the housing as the first mentioned contact member, a removable and reversible fuse carrier having an insulating front plate with an external handle, a contact blade carried by one end of the front plate and adapted to coact with the first mentioned contact member when the fuse carrier is inserted in the on position and adapted to frictionally engage the projection to hold the carrier in place when it is reversed and inserted in the off position, a positioning projection carried by the carrier at the end opposite its first mentioned blade adapted to engage and be guided by an end wall of the housing when inserting the carrier, a second contact blade carried by the carrier and adapted to coact with the second contact member in the housing when the fuse carrier is inserted in the on position and fuse holders connected with the respective contact blades for holding a cartridge type fuse lengthwise of the carrier.

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