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F. A. ERICSON

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FUSIBLE BUSWAY PLUG STRUCTURE WITH MOVABLE PLUG CARRIER MEMBER

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2 Sheets-Sheet 1

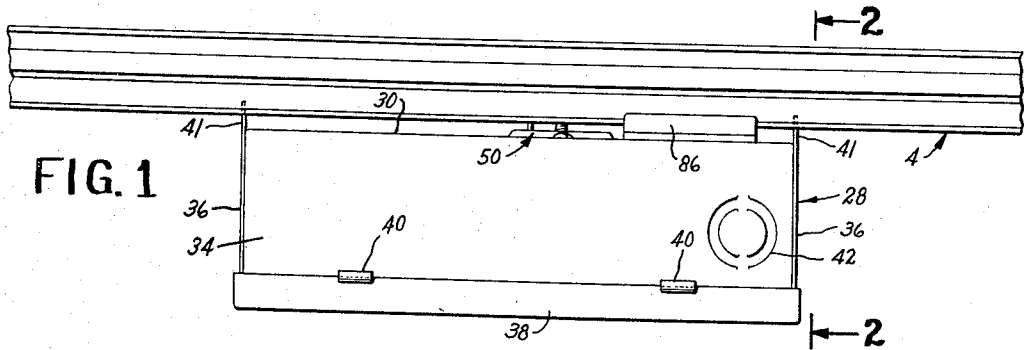


FIG. 1

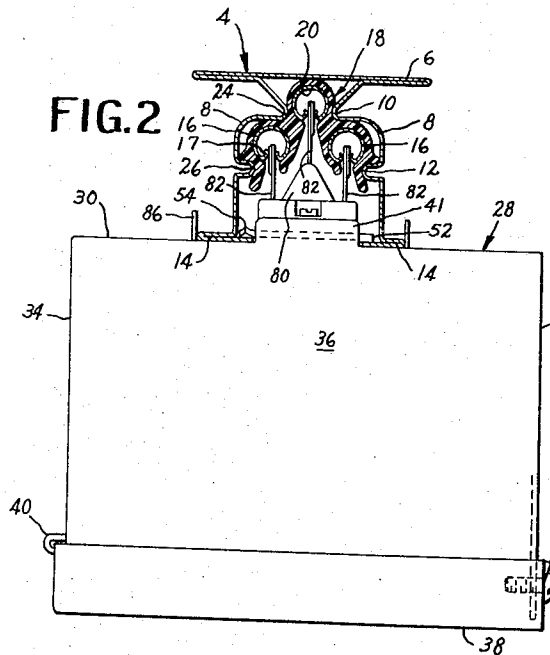


FIG. 2

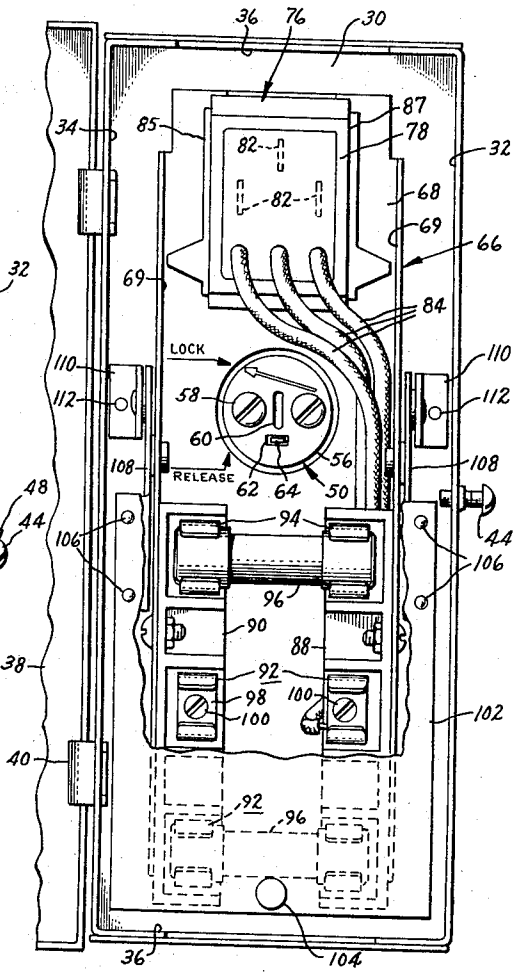


FIG. 3

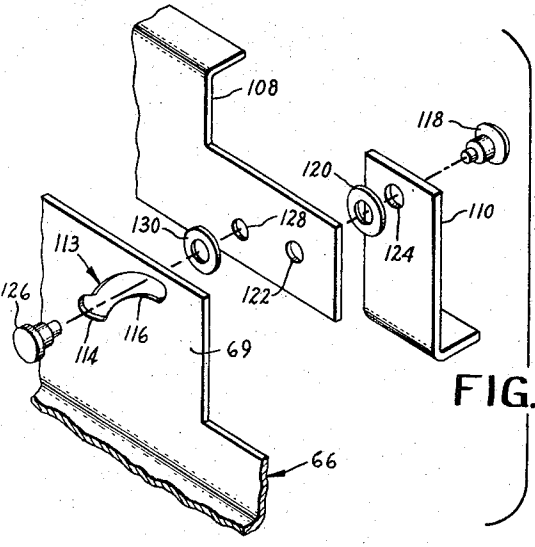


FIG. 4

INVENTOR.  
ERIC A. ERICSON

BY *Robert J. Casey*

ATTORNEY

Aug. 8, 1967

E. A. ERICSON

3,335,329

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FIG. 5

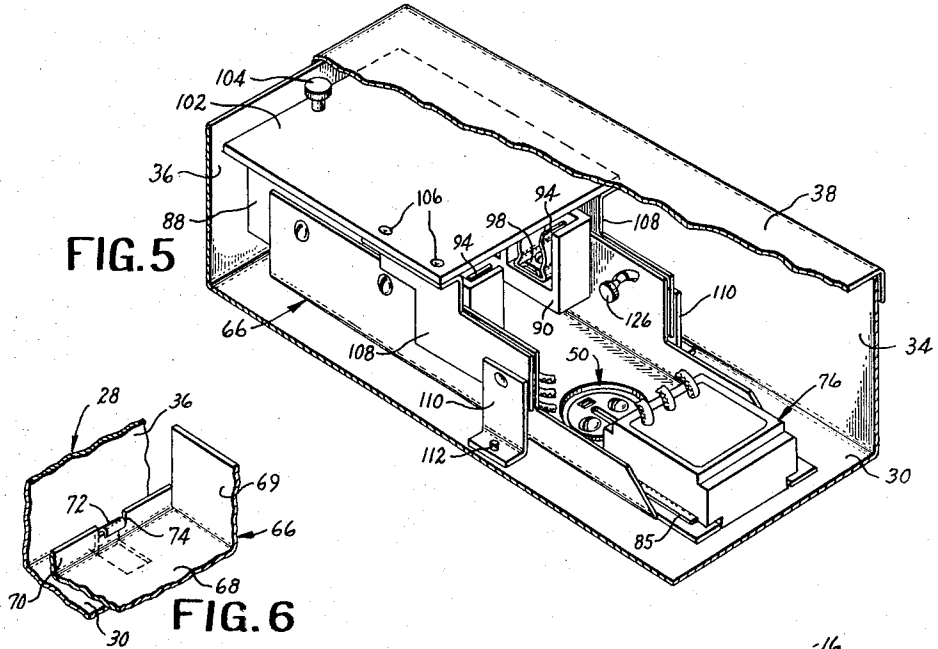


FIG. 6

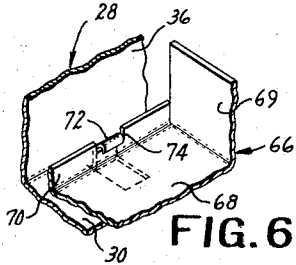


FIG. 7

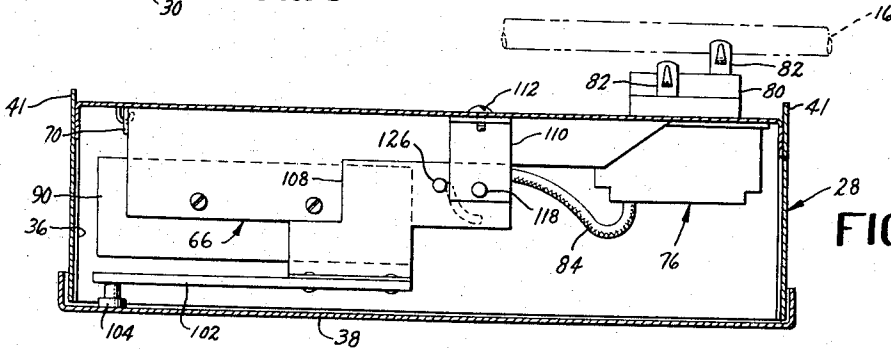
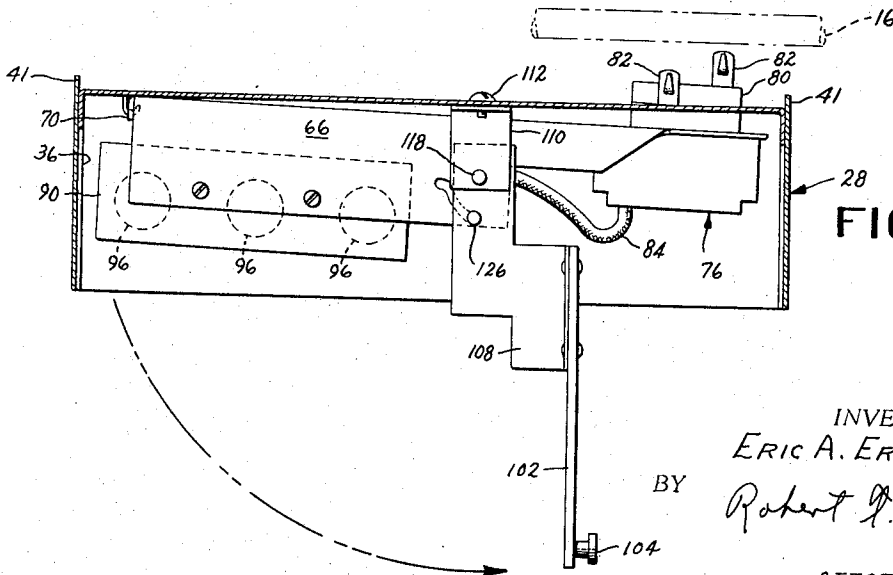


FIG. 8



INVENTOR.  
ERIC A. ERICSON

BY

Robert P. Casey

ATTORNEY

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**FUSIBLE BUSWAY PLUG STRUCTURE WITH MOVABLE PLUG CARRIER MEMBER**

Eric A. Ericson, Plainville, Conn., assignor to General Electric Company, a corporation of New York  
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 8 Claims. (Cl. 317-116)

**ABSTRACT OF THE DISCLOSURE**

A plug-in type power take-off device including an enclosure having an openable cover. A carrier inside the enclosure supports electrical fuses and plug-in type contacts which project through an opening in the back wall of the enclosure for contact with bus bars in a busway. Connecting means between the cover and the carrier causes the carrier to move so as to disconnect the contacts from the bus bars as the cover is opened, thereby removing power from the fuses.

The present invention relates to power distribution systems and more particularly to a novel and improved fusible plug-in attachment for electrical busways.

In taking power from a power distribution system of the type employing a busway, generally a device is employed having stabs or contacts for engagement with the several busbars of the busway. As is well recognized, it is often desirable to employ fuses in the take-off to avoid damaging elements in the remainder of the system upon overload or short-circuit conditions. Accordingly, many plug-in attachments for busways contain fuses therein and it is occasionally necessary to replace these fuses after overload conditions. Because of the relatively large voltage or current in most distribution systems wherein busways are employed, there is a danger that an operator opening the takeoff device to replace the fuses may be injured by continuing electrical engagement of the take-off device with the busway.

It is an object of the present invention to provide a novel and highly effective takeoff device for attachment to a busway which will substantially prevent injury to an operator replacing fuses therein.

It is also an object of the present invention to provide such a plug-in device which is simple in operation, rugged in construction, and relatively economical to manufacture.

Another object is to provide such a device wherein initial action by the operator in attempting to replace the fuses will automatically disconnect the device from electrical engagement with the busway.

Other objects and advantages will be readily apparent from the following detailed specification and the appended claims.

It has now been found that the foregoing related objects and advantages may be readily attained in a plug-in device for attachment to a busway of the type having a plurality of busbars formed with longitudinally extending channels to seat the stabs or contacts of the plug-in take-off device. In accordance with the present invention, the plug-in device includes a housing having means thereon for engagement with the busway in a fixed position and a carrier member pivotably mounted adjacent one end thereof within the housing. Stab contacts are carried by the carrier member adjacent the other end thereof and extend outwardly of the housing for engagement with the channels of the busbars in the busway. Mounted on the carrier member and electrically engaged with the stab contacts is one or more fusible elements and a cover member is disposed over the fusible elements within the housing. Pivot means are provided which pivotably mount one

end of the cover member on the carrier member over the fusible elements and also on the housing. The pivot means includes a track in one of the cover and carrier members and a pivot member on the other which slides in the track. In this manner, pivotal movement of the other end of the cover to gain access to the fusible elements provides sliding movement of the pivot member within the track. The track is configured to cam the pivot member during the pivoting of the one end of the cover member about its pivotal mounting to the housing and to produce pivotal movement of the other end of the carrier member and the stabs relative to the housing and toward the cover member, thus seating the stabs or unseating the stabs from the busbars.

In accordance with the preferred embodiment of the present invention, the pivot means includes a pair of pivot members on each side of the cover member with the first pivot member of each pair being located adjacent the pivoted end of the cover member and being pivotably engaged with the housing to provide a fixed pivot for the cover member upon the housing member. One of the cover and carrier members has a generally curvilinear track therein spaced from the first pivot member and the other of the cover and carrier members carries the second pivot member of each pair which is slidably disposed within the curvilinear track. In this manner movement of the free end of the cover member produces movement of the second pivot within the track and the track is configured to cam the second pivot member and pivot the free end of the carrier member to and away from the housing member and thereby move said stab contacts carried thereon for seating within and unseating from the busbars of the busway.

Generally the track member is provided by a slot formed in one of the carrier and cover members. Highly desirable cam action is provided by a track having an initial portion in which the pivot member is disposed in the closed position of the cover member which provides a relatively abrupt camming action to pivot the carrier member abruptly upon initial pivoting of the free end of the cover member. Although the track may be formed in either of the carrier and cover members, highly desirable action has been obtained by a track within the carrier member in the form of an initial portion at only a slight angle to the longitudinal axis of the carrier member to produce abrupt camming action upon the pivot member during initial pivotal movement of the cover member. This track also has a secondary portion in the form of an arc drawn by a relatively large radius from a point or center disposed towards the base wall of the housing so as to permit relatively free movement of the pivot member.

The pivot support portions of the housing and the cover members may be integrally formed with the body thereof or more economically provided by brackets affixed thereto with portions extending toward each other and along cooperating side wall portions on the carrier member. In this fashion, the body of the cover member may be formed of insulating material and yet the supporting brackets in which the pivot means are disposed may be fabricated from metal for a high degree of wear resistance and relative freedom from friction.

In accordance with conventional practice, the housing has a base wall, side and end walls and a cover which is hingedly mounted thereon to provide an enclosure for the carrier member and other components. In addition, means are provide on the base wall of the housing for releasably engaging the plug-in attachment to the busway. Generally, such attaching means will comprise a latch plate which may be rotated into engagement with the flanges of a busway housing defining a channel permitting

insertion of the stab contacts therethrough and into the busbars.

For a more complete understanding of the present invention, reference should now be made to the following detailed specification and to the accompanying drawings wherein:

FIGURE 1 is a side elevational view of an assembly of a plug-in device embodying the present invention and a fragmentarily illustrated busway;

FIGURE 2 is a sectional view to an enlarged scale along the line 2—2 of FIGURE 1;

FIGURE 3 is a plan view to an enlarged scale of the plug-in device with the housing cover open and partially broken away and with a portion of the cover member for the fusible elements broken away for clarity of illustration;

FIGURE 4 is an exploded fragmentary view to an enlarged scale of elements providing one of the pivotal mountings for the cover member overlying the fusible members;

FIGURE 5 is a perspective view to an enlarged scale of the plug-in device with a side wall and end wall of the housing removed and portions of the cover of the housing and cables broken away for clarity of illustration;

FIGURE 6 is a fragmentary perspective view of the pivotal mounting of the carrier member to the housing;

FIGURE 7 is a partially diagrammatic view showing the plug-in device operating elements in the position with the cover member overlying the fusible elements in closed position; and

FIGURE 8 is a similar diagrammatic view showing the operating elements with the cover member pivoted into open position.

Referring now in detail to the attached drawings, FIGURES 1 and 2 illustrate a plug-in device embodying the present invention as attached to a power distribution busway having a housing generally designated by the numeral 4 and formed of sheet metal with a top wall 6, a pair of side walls 8 with inwardly extending lip portions 10, 12 and base flanges 14, which are spaced apart to define a channel therebetween.

Within the housing 4 are a plurality of hollow generally tubular busbars 16 of copper, aluminum or other highly conductive metal and which have spaced apart, in-turned edges providing longitudinally extending channels 17 therebetween and a flexible insulating member generally designated by the numeral 18. The insulating member 18 has a generally trilobal configuration with an elongated cavity 20 in each lobe receiving and separating the busbars 16 and providing an elongated slot facing the housing base flanges 14 and permitting access to the channels 17 of the busbars 16 which are aligned therewith. The configuration of the insulating member 18 also provides shoulders 24, 26 for engagement with the lip portions 10, 12 to maintain the assembly thereof.

The plug-in device mounted on the busway has a housing generally designated by the numeral 28 with base wall 30, side walls 32, 34, end walls 36 and a peripherally flanged cover 38 pivotably mounted on the side wall 34 by the hinges 40. The end walls 36 are provided with lugs 41 adjacent the base wall 30 which seat within the channel of the busbar housing 4 between the flanges 14 to assist in obtaining and maintaining alignment. In accordance with conventional practice, knock-outs 42 are provided in the housing 28 for introducing leads (not shown) and a screw 44 is mounted in the side wall 32 for seating in a slot (not shown) of the flange of the cover 38 and locking it in closed position by engagement with the bent-up portion 48 of the flange of the cover 38 adjacent the slot.

The housing 28 is engaged on the busway housing 4 by the latch assembly generally designated by the numeral 50. As seen in FIGURE 2, a latch plate 52 which is of greater length than the channel between the base flanges 14 of the busway housing 4 is supported outwardly

of the housing 4 and may be inserted into the channel and then rotated so as to seat upon the flanges 14 as shown therein. To facilitate movement of the latch plate 52 onto the flanges 14, the leading edges of the latch plate 52 are provided with bent-up portions 54 which act as cam surfaces.

Referring now to FIGURE 3, rotation of the latch plate 52 is effected by the latch washer 56 on the inside of the housing 4 which is coupled to the latch plate 52 by a pair of screws 58 seated therein and extending through an aperture (not shown) in the base wall 30 configured and dimensioned to permit limited rotation of the assembly. As seen, the latch washer 56 has a slot 60 therein for engagement by a screwdriver or other tool to effect rotation thereof and an additional aperture 62 is provided therein for seating an upstanding lug 64 on the latch plate 52 (seen in FIGURE 1) when the screws 58 are tightened and which abuts against a shoulder formed by the configuration of the aperture (not shown) in the base wall 30 to prevent rotation of the tightened latch assembly 50, thus locking the housing 28 upon the busway housing 4. For convenience, indicia are provided upon the base wall 30 to indicate the position of the latch assembly 50.

Within the housing 28 is a carrier member generally designated by the numeral 66 which has a base wall 68, side walls 69 and a flange 70 at one end thereof. As best seen in FIGURE 6, the carrier member 66 is pivotably mounted at one end on the housing 28 by the lug 72 which is staked out of the base wall 68 and seats in a notch 74 in the flange 70.

Adjacent its other end the carrier member 66 carries a plug formed of insulating material and designated generally by the numeral 76 and having a body portion 78 above the carrier member 76 and a cap portion 80 extending through an aperture 87 in the carrier member 16 and an aperture (not shown) in the base wall 30 of the housing 28. Seated within the plug 76 are three stab contacts 82 which engage in the channels 17 of the busbars 16 and flexible cables 84. On the bottom of the carrier member 66 are a support plate 85 and a channel-shaped plate 86 both of which have an aperture therein (not shown) cooperating with the aperture 87 in the carrier member 66 and the plate 86 is movable inwardly and outwardly of the aperture (not shown) in the base wall 30 with its leg portions extending outwardly of the flanges 14 of the busway housing 4 in the seated position of the stab contacts 82.

Adjacent its pivoted end, the carrier member 66 has mounted on the side wall 69 thereof a pair of fuse receptacles 88, 90, carrying clips 92 of metal with flexible arms 94 for seating a plurality of fuses 96. Cable pressure plates 98 within the clips 92 may be tightened by the screws 100 for securing the cables 84 from the contacts 82 to the clips 92 of the receptacle 88 and for securing cables (not shown) from a load to the clips 92 of the receptacle 90.

Overlying the fuse receptacles 88, 90 and therefore the fuses 96 is a cover member 102 of non-conductive material having a handle knob 104 at its end adjacent the end wall 36 and secured at the other end thereof by rivets or the like 106 to the handle brackets 108 which have portions extending downwardly along the side walls 69 of the carrier member 66. The cover member 102 is pivotably mounted at its end spaced from the end wall 36 to the carrier member 66 and to the pivot brackets 110, which are secured by rivets 112 or the like to the base wall 30 of the housing 28, by an arrangement which is best understood by reference to FIGURES 4 and 5. The side walls 69 of the carrier member are provided with generally curvilinear slots generally designated by the numeral 113 comprised of an initial or lower portion 114 extending at a relatively small angle of about 15° to the longitudinal axis of the carrier member and a relatively

large arcuate secondary portion 116 extending upwardly from the end thereof.

The cover member 102 is pivotably mounted at its end adjacent the free end of the carrier member 66 by the pivot pins 118 which seat in apertures 122 formed in the handle brackets 108 adjacent the ends thereof and apertures 124 formed in the pivot brackets 110 of the housing member 4, with washers 120 between the adjacent surfaces. At a point spaced from the fixed pivot provided by the pivot pins 118, the cover member 102 is also pivotably mounted to the carrier member 66 by pivot pins 126 which slidably seat in the tracks 113 of the carrier member side wall 69 and are carried in fixed position within the apertures 128 of the handle brackets 108 of the cover member 102 with the washers 130 between the adjacent surfaces.

In pivoting the cover member 102 from the closed position shown in detail in FIGURE 5 and diagrammatically in FIGURE 7, the cover member 102 pivots about its fixed pivot to the housing pivot brackets 110, thus producing movement of the pivot pins 126 within the tracks 113. In the closed position of the cover member 102, the pivot pins 126 are at the end of the initial portion 114 of the track adjacent the pivoted end of the carrier member 66. Because of the relatively small angle of the initial portion to the longitudinal axis of the carrier member 66, the pivoting of the cover member 102 causes the pivot pins 126 to bear against the upper or outer edge of the track 113 and to apply lifting pressure to elevate or pivot abruptly the carrier member 66 about its pivot to the housing member 28 at the lug 72. In this manner, the stab contacts 82 may be unseated rapidly from the busbars 16 during the initial pivoting of the cover member 102 to minimize the possibility of injury through contact with live fuse receptacles.

During continuing pivoting of the cover member 102 to the open position illustrated in FIGURE 8, the pivot pins 126 slide within the relatively large arcuate secondary track portions 116 to permit relatively unimpeded pivoting of the cover member 102. After replacement of a fuse 96, the closing of the cover member 102 will move the pivot pins 126 into the initial track portions 114 where they will now produce pressure on the bottom or inner edge of the track 113 and depress or pivot abruptly the carrier member 66 about its pivot to seat the stab contacts 82 in the busbars 16 only during the final closing movement of the cover member 102.

Although the illustrated embodiment shows the track as being formed in the carrier member, it will be readily apparent that it may be formed in the cover member and the pivot member carried by the carrier member. Moreover, the track may be provided by a slot as in the illustrated embodiment or it may be a recess formed in or molded into the surface of the part, or it may be milled into an edge of the part in the form of a notch. If rapid closing action by the camming effect is not desired, the track may act only in one direction by being an edge on the part with the carrier member being depressed into the closed position by the pressure of the body of the cover member directly upon the adjacent surface of the carrier member. Various other inversions and modifications of the illustrated embodiment will be apparent to those skilled in the art.

Thus, it can be seen that the present invention provides a novel and highly effective takeoff device for attachment to a busway which will substantially prevent injury to an operator replacing fuses therein since his initial action in opening the cover over the fuses will automatically pivot the carrier member and disconnect the stab contacts from the busway to deenergize the fuses. Moreover, the device also may effect energizing of the fuses only during the last stages of closing action of the cover over the fuses to prevent injury. The device is simple in operation, may be rugged in construction and is relatively economical to

manufacture while affording a high degree of safety to the operator and ease of installation and maintenance.

It is well understood that various changes in the details, materials, and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the claims.

Having thus described the invention, I claim:

1. A plug-in power take-off device for use with an electric power busway having a plurality of bus bars enclosed therein comprising:

- (a) a housing;
- (b) a carrier member;
- (c) means supporting said carrier member in said housing for movement between first and second positions therein;

- (d) a plurality of stab contacts supported on said carrier member, said stab contacts being in bus bar engaging position when said carrier member is in said first position and being in disengaged position when said carrier member is in said second position;

- (e) a plurality of fuse-receiving sockets mounted within said housing each electrically connected to one of said stab contacts;

- (f) a cover member pivotally mounted on said housing and movable between closed and open positions, said cover member when in said closed position preventing access to said fuse-receiving sockets and when in said open position affording access thereto; and

- (g) interconnecting means interconnecting said cover member and said carrier member for moving said carrier member from said first to said second position and said stab contacts from said bus bar engaging position to said disengaged position upon movement of said cover member from said closed to said open position.

2. A plug-in power take-off device as set forth in claim 1, wherein said interconnecting means comprises camming means.

3. A plug-in power take-off device for use with an electric power busway having a plurality of bus bars enclosed therein comprising:

- (a) a housing;
- (b) a carrier member having one end pivotally mounted within said housing and movable between first and second positions;

- (c) at least one stab contact supported on said carrier member adjacent the other end thereof, said stab contact extending outwardly of said housing for engagement with one of said plurality of bus bars when said carrier member is in said first position and disengagement from said bus bar when said carrier member is in said second position;

- (d) a fuse-receiving socket mounted within said housing and electrically connected to said stab contact;

- (e) a cover member movable between open and closed positions, said cover member when in said closed position preventing access to said fuse-receiving socket and when in said open position affording access thereto; and

- (f) pivot means mounting one end of said cover member on said housing, interconnecting means carried by said cover member and said carrier member, said interconnecting means including a cam track and a cam member slidably disposed in said track, movement of said cover member about said pivot means from said closed to said open position producing movement of said cam member within said track and movement of said carrier member relative to said housing to move said stab contact from engaged to disengaged condition relative to said bus bars.

4. A plug-in power take-off device as set forth in claim 3, wherein said track has an initial portion within which

said cam member is disposed when said cover member is in said closed position providing a relatively abrupt camming action to pivot said carrier member abruptly upon initial pivoting of said cover member, from said closed toward said open position.

5 5. A plug-in power take-off device as set forth in claim 4, said track having an initial portion and a secondary portion, movement of said cover member producing a proportionally greater amount of movement of said carrier member when said cam member is disposed in said initial portion than when said cam member is disposed in said secondary portion.

10 6. A plug-in power take-off device for use with an electric power busway having a plurality of bus bars enclosed therein comprising:

- (a) a housing having a base wall for positioning adjacent said busway when said device is mounted on said busway;
- (b) a carrier member having one end pivotally mounted on said housing for pivotal movement relative to said base wall;
- (c) at least one stab contact supported on said carrier member adjacent the end thereof opposite said one end, said stab contact extending through an opening in said base wall of said housing for engagement with one of said plurality of bus bars;
- (d) a fuse-receiving socket mounted within said housing and electrically connected to said stab contact;
- (e) a cover member carried by said housing and movable between first and second positions, said cover member when in said first position preventing access to said fuse-receiving socket and when in said second position affording access thereto;
- (f) pivot means pivotally supporting one end of said cover member on said housing; and

(g) interconnecting means carried by said cover member and said carrier member, said interconnecting means comprising a pair of spaced connecting assemblies each of said assemblies including a generally curvilinear cam track and a cam member slidably disposed in said track, movement of said cover member about said pivot means producing movement of each of said cam members within the corresponding one of said tracks and movement of said carrier member relative to said housing and movement of said stab contact relative to said bus bars.

15 7. A plug-in power take-off device for use with an electric busway as set forth in claim 6, each of said tracks having an initial portion extending away from said base wall of said housing at a relatively small angle and a secondary portion, movement of said cover member producing a proportionally greater amount of movement of said carrier member when said cam member is disposed in said initial portion than when in said secondary portion.

20 8. A plug-in type power take-off device as set forth in claim 6 wherein said cover member is mounted within said housing, said power take-off device also including a second cover member movably mounted on said housing opposite said base wall, said second cover member overlying said first cover member.

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ROBERT K. SCHAEFER, *Primary Examiner.*

35 J. R. SCOTT, *Assistant Examiner.*