Jan. 31, 1967 E. A. ERICSON 3,301,989

HANDLE ASSEMBLY FOR CIRCUIT BREAKERS

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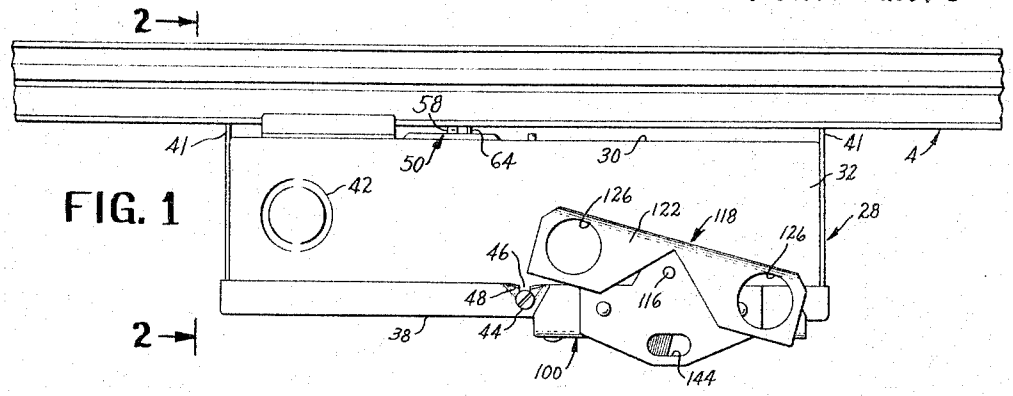


FIG. 1

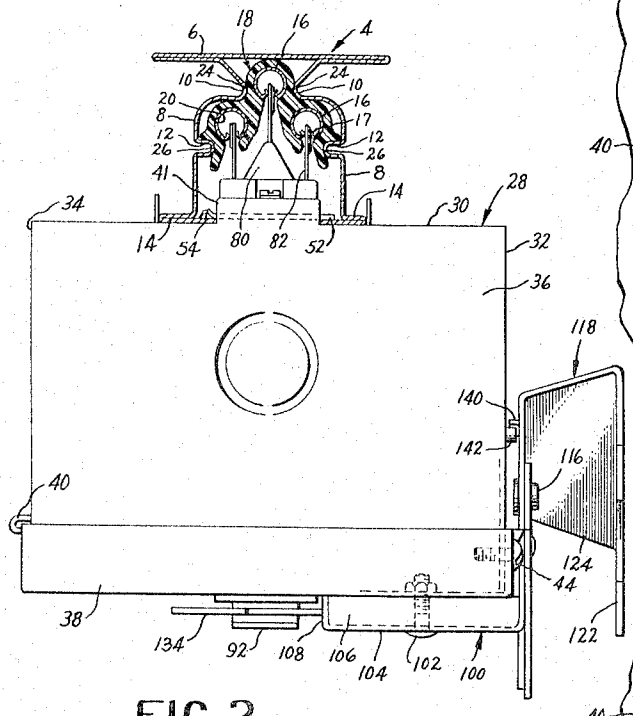


FIG. 2

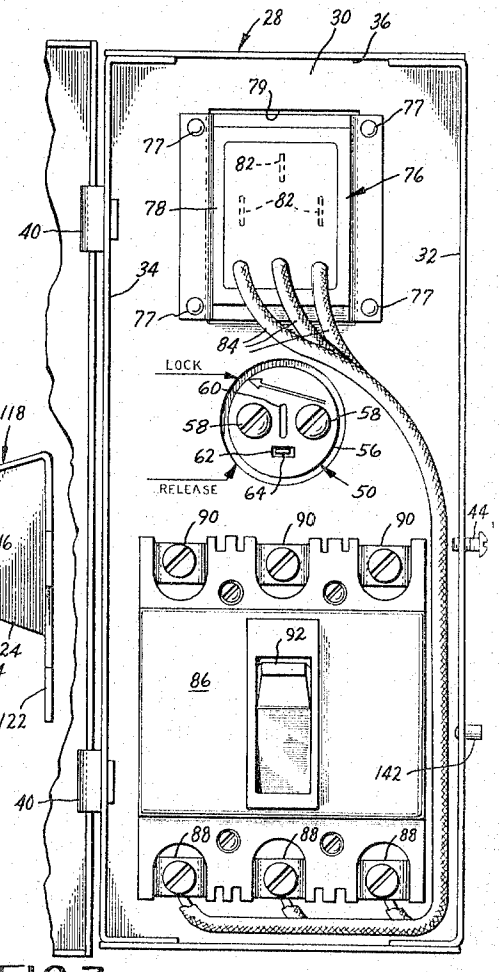


FIG. 3

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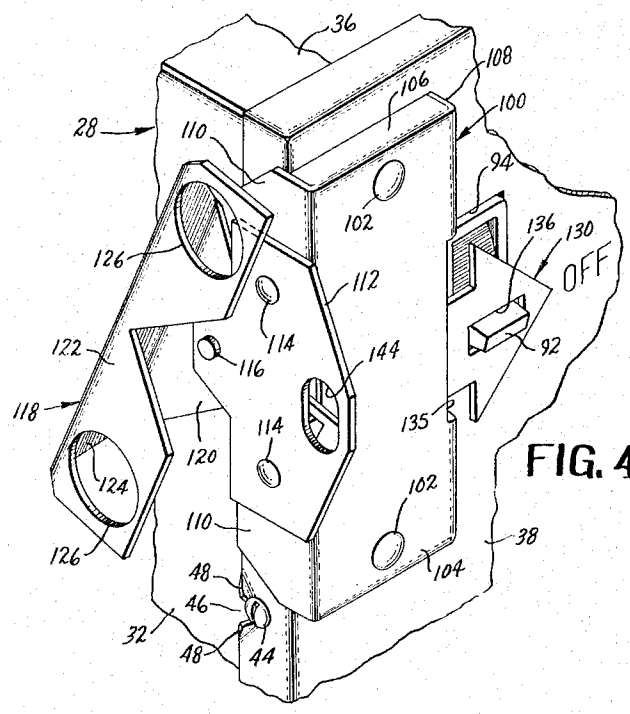


FIG. 4

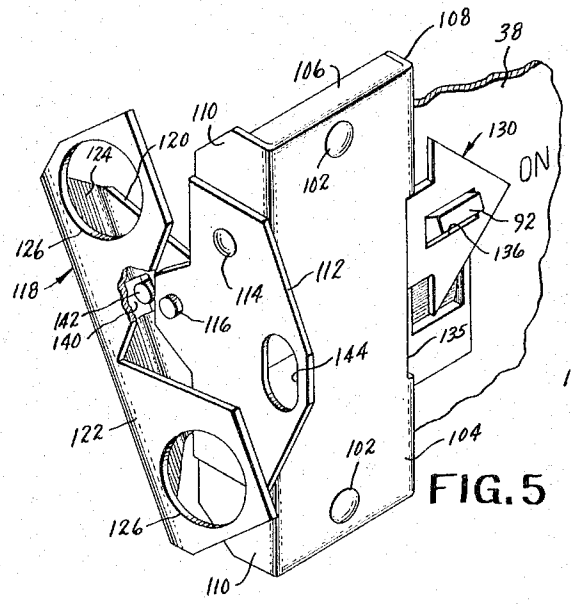


FIG. 5

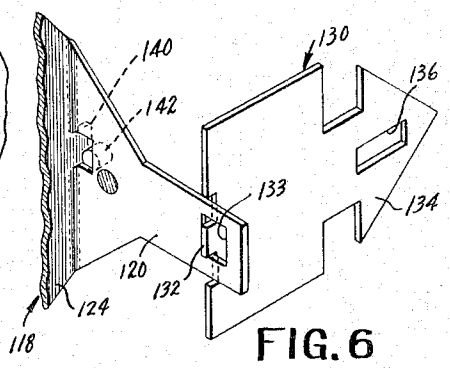


FIG. 6

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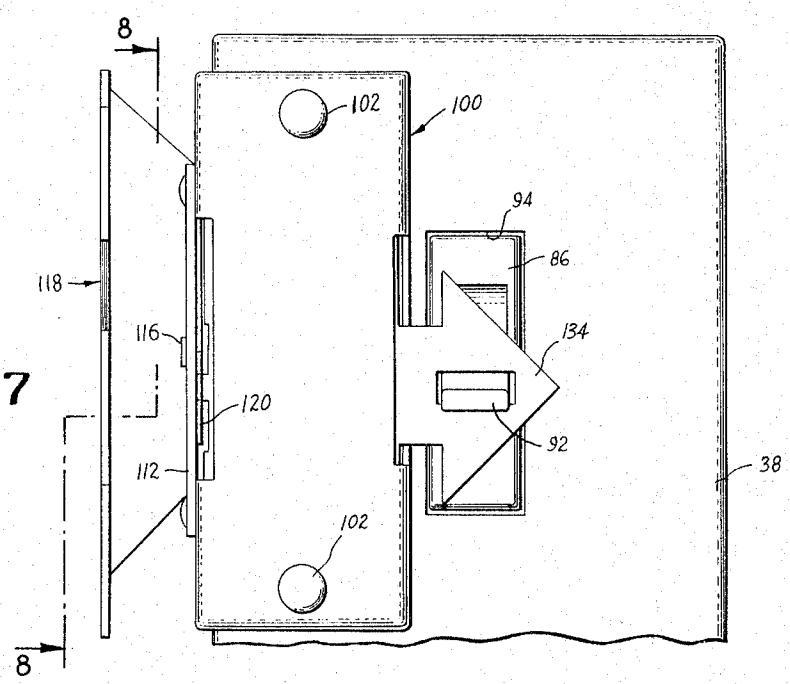


FIG. 7

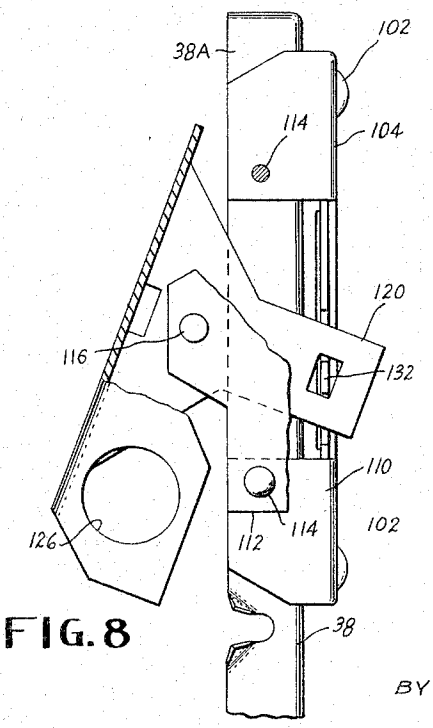


FIG. 8

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3,301,989

HANDLE ASSEMBLY FOR CIRCUIT BREAKERS

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Filed July 2, 1965, Ser. No. 469,134
5 Claims. (Cl. 200—172)

The present invention relates to handle attachments for circuit breakers and, more particularly, to a novel and improved external handle assembly for attachment to circuit breakers of the type having an operating member extending outwardly from the cover of the housing of the circuit breaker.

It is frequently necessary to take power from a power distribution system by means of a plug-in or other type circuit breaker that must be located in places that are not easily reached by reason of the height above floor level or location within a recess. Generally, various circuit breaker devices have been proposed for a remote operation by a hooked stick or similar means so that manual movement of an operating member extending outwardly through the housing of the circuit breaker will open or close the electrical circuit therein. In circuit breakers generally it is often desirable for safety and convenience to have means for preventing opening of the cover of the circuit breaker housing when the circuit breaker is in the on position, and also to have means for locking the circuit breaker in the off position. With remote devices particularly, it is highly advantageous that the device have an indicator that will show whether the circuit breaker is in the on or the off position and that may be seen at a relatively large distance therefrom. Various city and state codes require that one or more of these features be incorporated in the construction of circuit breakers. Accordingly, remotely operated circuit breaker assemblies have oftentimes been specially constructed and relatively expensive units which factors have limited their utility and application.

It is an object of the present invention to provide a novel external handle assembly which may be readily attached to a standard circuit breaker and which may be readily operated from a distance by a hooked stick or similar device.

It is also an object to provide such a handle assembly that prevents the cover of the circuit breaker housing from being opened when in the on position.

Another object is to provide such a handle assembly which is simple in operation, rugged in construction, relatively economical to manufacture and which is readily attachable to various conventional circuit breaker constructions having the handle of the switch extending outwardly of the front cover of the circuit breaker housing.

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

It has now been found that the foregoing and related objects and advantages may be readily attained in a novel external handle assembly adapted for use on a circuit breaker having a housing with a hinged cover and a switch with a handle extending outwardly through the cover. The handle assembly has a support element for mounting externally on the cover of the housing of the circuit breaker on a side of the cover other than the hinged side thereof. An operating member is slidably mounted on the support element and has a switch engaging portion for engaging the switch handle whereby the switch handle may be operated to the on and the off position. In addition, the operating member has a portion engageable with the exterior of the housing when the switch is in the on position to prevent opening of the cover.

Although the operating member may be a single element

slidably mounted on the support element, a more readily fabricated and highly efficacious structure is provided by a preferred arrangement wherein an indicator is slidably mounted on the support element for engaging the switch handle and a separate handle is pivotably mounted on the support element and engaged with the actuator to effect the sliding movement thereof to operate the switch handle. This not only facilitates construction and operation but also permits wider variation in design of housing and handle assembly interlocks.

The handle assembly of the present invention may be readily applied to various conventional circuit breakers of the type having a cover which is hinged to one side thereof and held in a closed position by a screw or similar means in another side thereof and also having one or more switches therein manually operable by one or more handles thereon extending outwardly through an aperture or apertures in the cover. The handle assembly is conveniently mounted to the circuit breaker by threaded fasteners and the like and may also be removed therefrom if so desired.

In accordance with the preferred embodiment of the present invention, the handle assembly includes a support element mounted on the cover of the circuit breaker housing adjacent the side of the housing adjacent the free end of the cover, i.e., the side opposite the side to which the cover is hinged. The support element has a top wall with depending portions on three sides of the top wall to abut against the cover of the housing, and leg portion depending on the fourth side which extends along the side of the housing. Thus, the support element forms an enclosure for the actuator which is slidably mounted therein and which has a switch engaging portion extending outwardly through a guide slot formed in the depending portion of the support element facing the switch and which has means for engaging the handle of the switch which extends through the cover of the housing. The actuator is slidably connected to the handle which is pivoted to the leg portions of the support element, and is movable within the support element by corresponding movements of the handle. Accordingly, by pivoting the handle, the actuator is moved within the support element and its engaging portion thereby positions the operating handle of the switch in the on or off position. For engagement by a hooked stick and the like, the handle has a portion with relatively large apertures.

The handle assembly of this invention may also incorporate a number of convenience and safety features. As a safety feature, the handle is provided with a shoulder for engagement with a stop on the housing which are positioned so that the cover of the housing may not be opened when the switch handle is in the on position. As an additional safety feature, a plate is supported by the leg portions of the support element and, in turn, pivotably carries the handle and has an aperture for the insertion of a lock which will engage the handle and prevent the handle from moving from the off position. As a convenience feature, the acutators desirably is provided with an indicator portion cooperating with indicia on the cover of the housng that may be seen at a relatively large distance to indicate whether the switch is in the on or off position, conveniently in the form of an arrow. Accordingly, there may be provided a highly effective and relatively economical handle assembly for remote operation of conventional circuit breakers of the type described and which may incorporate convenience and safety features at little extra cost.

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

FIGURE 1 is a side elevation view of a fragmentarily illustrated busway and a plug-in type circuit breaker having the handle assembly of the present invention attached thereto;

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 circuit breaker of FIGURE 1 with the housing cover open and partially broken away;

FIGURE 4 is a fragmentary perspective view to an enlarged scale of the handle assembly and circuit breaker of FIGURE 1 with the operating elements in the off position;

FIGURE 5 is a perspective view to an enlarged scale of the handle assembly and a fragmentary portion of the cover of FIGURE 1 with the switch handle of the circuit breaker in the on position and with a portion of the handle broken away for clarity of illustration;

FIGURE 6 is a fragmentary perspective view to an enlarged scale of the handle and actuator of the handle assembly and the interlock pin on the circuit breaker housing;

FIGURE 7 is a fragmentary plan view of a portion of the circuit breaker of FIGURE 1, and

FIGURE 8 is a sectional view of the handle assembly mounted on the housing cover, taken on a section such as line 8—8 of FIGURE 7, portions being broken away.

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, inturned 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 load cables (not shown) and a screw 44 is mounted in the side wall 32 for seating in a slot 46 of the flange of the cover 38 and locking it in closed position by engagement with the bent-up portions 48 of the flange of the cover 38 adjacent the slot 46.

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 in FIGURE 2. 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 28 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 (best 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.

A plug formed of insulating material and designated generally by the numeral 76 is secured to the base wall 30 at one end of the housing 28 by screws 77 and has a body portion 78 and a cap portion 80 extending through an aperture 79 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 are electrically connected to flexible cables 84.

A circuit breaker switch 86, contained within housing 28, is attached to the base wall 30 at the other end of the housing 28 and has line terminals 88 electrically connected to the flexible cables 84 on one side of the switch 86. On the opposite side of the switch 86 are the load terminals 90 which may be electrically connected to flexible cables (not shown) passing through knock-outs 42 to an associated load. The switch 86 has an operating member or handle 92 extending upwardly through an aperture 94 in the cover 38 so that the switch 86 may be operated without opening cover 38 by movement of the operating member 92. Contacts (not shown) in switch 86 are operated to the open or closed position by movement of the operating member 92 so that an electrical circuit is open or closed between the line terminal 88 and load terminal 90.

To easily operate the circuit breaker in difficult to reach places such as on ceilings or recesses, it is provided with an external handle assembly that may be conveniently attached thereto and operated by a long pole with a hook on one end thereof or a like device. The external handle assembly has a generally right-angle support element generally designated by the numeral 100 which is secured to side flange 38A of the cover 38 by the screws 102 in the top wall 104 of the support element 100 near the side wall 32 of the housing 28. The support element 100 has depending end walls 106 and a depending side wall 108 all of which extend from the top wall 104 and abut against the cover 38 whereby the top wall 104 is spaced a short distance therefrom. Two spaced leg portions 110 also depend from the top wall 104 of the support element 100 and extend downwardly along the side wall 32 of the housing 28. A bridging plate member 112 is attached to the leg portions 110 of support element 100 by means of the rivets 114 and a portion of plate member 112 extending below the leg portions 110 carries the pivot pin 116. The end walls 106, side wall 108, leg portions 110 and bridging plate member 112 depend from top wall 104 of support element 100 to form an enclosure cooperating with the cover 38 which acts as the bottom wall.

Pivotably mounted on the pivot pin 116 of the support element 100 is a generally channel-shaped operating handle designated generally by the numeral 118 which has leg portions 120, 122 and a connecting portion 124. The inner leg portion 120 of handle 118 is pivotally mounted on pin 116 of plate member 112 and extends along the side wall 32 of housing 28, and the outer leg portion 122 has circular holes or apertures 126 to pro-

vide a hooking portion for engagement by a hook or the like.

An actuator generally designated by the numeral **130** is slidably mounted partially within the enclosure provided by support element **100** and is slidably engaged with the inner leg portion **120** of the handle **118** by a tab portion **132** thereon which fits into the aperture **133** on one end of handle leg portion **120**. The actuator **130** has an engaging portion **134** which passes outwardly through a guide slot **135** in the side wall **108** of support element **100** adjacent switch **86** and has an aperture **136** therein which seats the operating member or switch handle **92** of the switch **86**. The engaging portion **134** of the actuator **130** has its outer end shaped in the form of an arrow to point to indicia such as the legends "On" and "Off" on cover **38** to indicate when the switch handle **92** of the switch **86** is in the on or off position.

The handle assembly may be operated to position the switch handle **92** in the on or off position by pivoting the handle **118** on the pivot pin **116** through engaging the hooking leg portion **124** manually or remotely by placing a hook on the end of a long pole in the circular holes **126**. When the handle **118** is rotated on pivot pin **116**, the tab portion **132** of the actuator **130** is slidably engaged within the aperture **133** of the handle leg portion **120** and the actuator **130** is thereby moved in the guide slot **135** of the support element **100** so that the extending portion **134** moves the switch handle **92** to the "on" or "off" position.

As a safety feature, to prevent the cover **38** of the housing **28** from being opened when the switch handle **92** is in the on position, a lug **140** is cut out of the handle leg portion **120** and bent into the plane of the connecting portion **124** providing a shoulder which abuts against a stop or interlock pin **142** on the side wall **32** of housing **28** between the shoulder **140** and cover **38** when the handle **118** is in the on position. As an additional safety feature, the plate member **112** on the support element **100** is provided with a locking aperture **144** in the portion extending above the support element **100** into which may be inserted the hasp of a lock to abut against a cooperating portion on the leg portion **120** of the handlle **118**, thereby preventing the handle **118** and actuator **130** from being moved from the then existent position. By this method the operating member **92** of switch **86** may be locked into the on or off position to avoid inadvertent movement.

Thus, the present invention provides a novel external handle assembly which may be readily attached to a conventional circuit breaker of the type having a switch handle extending through an aperture in the cover of the circuit breaker housing. The handle assembly may be conveniently operated from a distance by a hooked stick or similar device and may include means for indicating the switch condition. The handle assembly is simple in operation, rugged in construction and relatively economical to manufacture and may readily incorporate various safety features required to meet the requirements of city and state codes.

It is well understood that various changes in the details, materials, and arrangement 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. An external handle assembly adapted for use on a circuit breaker having a housing with a hinged cover pivotally mounted on the housing at one side thereof, and a switch in said housing with a handle extending outwardly through the cover comprising:

(a) a support element for mounting externally on said hinged cover adjacent the free end of said cover, said support element having a top wall and side walls for spacing said top wall from said cover of said housing;

(b) an actuator slidably mounted within said support element, said support element having a guide slot in one of said side walls and said actuator having an engaging portion extending outwardly of said slot having an aperture therein for receiving the switch handle;

(c) a handle pivotally mounted on said support element and slidably engaged with said actuator for effecting movement thereof and thereby of the switch handle to operate the switch to the "on" and "off" positions, said handle being operable remotely by a stick and the like and having a portion adapted to extend along the exterior of the side wall of the housing adjacent the free end of the cover, said handle having a shoulder thereon; and

(d) an interlocking member mounted on the exterior of the side wall of the housing adjacent the free end of the cover for engagement with said shoulder when the switch is in the "on" position whereby said cover may be prevented from opening.

2. An external handle assembly adapted for use on a circuit breaker having a housing with a hinged cover pivotally mounted on the housing at one side thereof and a switch in said housing with a handle extending outwardly through the cover comprising:

(a) a support element having a plurality of depending portions forming an enclosure and having means for mounting externally on said hinged cover adjacent the free end of said cover;

(b) an actuator slidably mounted partially within said support element, said support element having a guide slot in one of said depending portions and said actuator having an engaging portion extending outwardly of said slot having an aperture therein for receiving the switch handle, and means on said engaging portion for registering with indicia on said cover of said housing to indicate the position of said switch handle;

(c) a generally channel-shaped handle pivotally mounted on said support element providing a pair of legs and slidably engaged with said actuator for effecting movement thereof and thereby of the switch handle to operate the switch to the "on" and "off" positions, the outer of said legs forming a portion with a plurality of apertures for engagement by a stick and the like for remote operation, and the other of said legs forming a portion adapted to extend along the exterior of the side wall of the housing adjacent the free end of the cover, said handle having a shoulder thereon; and

(d) an interlocking member mounted on the side wall of the housing adjacent the free end of the cover for engagement with said shoulder when the switch is in the "on" position whereby the cover may be prevented from opening.

3. An enclosed circuit breaker assembly comprising:

(a) a generally rectangular housing having a bottom wall and side walls extending substantially perpendicular thereto;

(b) a generally planar cover having a pair of spaced parallel edge portions, said cover being hingedly connected at a first one of said edge portions to a first one of said side walls;

(c) a switch mounted in said housing and having a handle extending outwardly through said cover and movable between "on" and "off" positions;

(d) a generally planar support mounted externally on said cover adjacent the other of said parallel edge portions, said support having a first portion extending substantially parallel to and overlying said cover and a depending portion extending substantially parallel to and spaced closely from a second one of said side walls opposite said first side wall;

(e) an actuator slidably mounted on said first portion of said support, said actuator having an aperture therein receiving said switch handle;

(f) an operating handle pivotally mounted on said depending portion of said support, means carried by said operating handle engaging said actuator and moving said actuator between "on" and "off" positions corresponding to "on" and "off" positions of said switch handle in response to movement of said operating handle between "on" and "off" positions; and

(g) interlocking means carried by said operating handle and said housing, said interlocking means preventing opening of said cover when said operating handle is in said "on" position.

4. An enclosed circuit breaker assembly comprising:

(a) a generally rectangular housing having a bottom wall and side walls extending substantially perpendicular thereto;

(b) a generally planar cover having a pair of spaced parallel flange portions, said cover being hingedly connected at a first one of said flange portions to a first one of said side walls;

(c) a switch mounted in said housing and having a handle extending outwardly through said cover and movable between "on" and "off" positions;

(d) a generally right-angle support having a planar portion extending substantially parallel to and overlying said cover and a pair of spaced depending portions extending substantially parallel to and spaced closely from a second one of said side walls opposite said first side wall;

(e) an actuator slidably mounted between said cover and said planar portion of said right-angle support, said actuator having an aperture therein receiving said switch handle;

(f) a bridging plate fixedly mounted on said pair of spaced depending portions and spaced from said other of said parallel flange portions;

(g) an operating handle positioned in said space between said bridging plate and said other of said parallel flange portions, and pivotally supported on said bridging plate, and

(h) means connecting said operating handle and said actuator for operating said actuator between "on" and "off" positions corresponding to "on' and "off" positions of said switch handle in response to movement of said operating handle between "on" and "off" positions.

5. An enclosed circuit breaker assembly as defined in claim 4, said assembly also comprising interlocking means carried by said operating handle and said housing, said interlocking means preventing opening of said cover when said operating handle is in said "on" position.

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