United States Patent

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[54] **REVERSIBLY MOUNTABLE LIMIT SWITCH CONSTRUCTION**
6 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **200/168,** 200/47
[51] **Int. Cl.** **H01h 9/02**
[50] **Field of Search** ..... 200/47, 168 (G); 174/65; 339/107

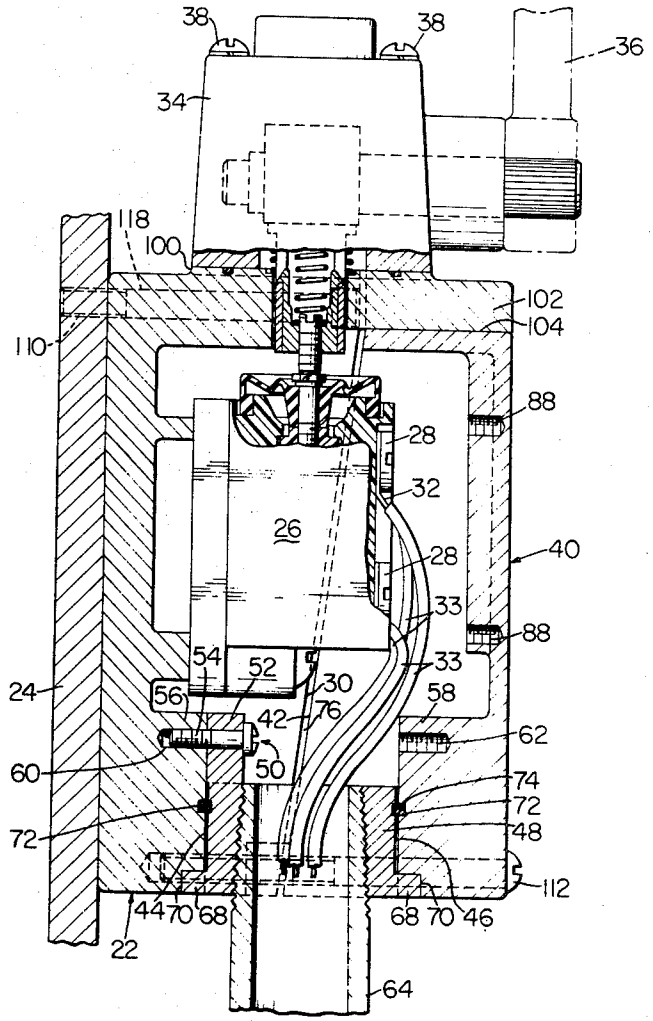
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ABSTRACT: This application discloses a limit switch having a cup-shaped switch-supporting casing with an open rim, and a cup-shaped switch cover casing with an open rim. Either of these casings may be mounted on a support wall with its rim exposed. Then the other casing may cover the supported casing, rim to rim, to form a combined closed casing. The switch-supporting casing has an operator head at the top and a powerline-receiving notch at the bottom. The switch cover casing has a powerline-receiving notch at the bottom. Prong receptacle means may be added to the switch cover casing so that the powerline terminals may be attached thereto and prongs may be added to the switch support casing, when the switch cover casing is attached to the support wall as a plug-in installation.



Patented May 18, 1971 3,578,932

4 Sheets-Sheet 1

FIG-1

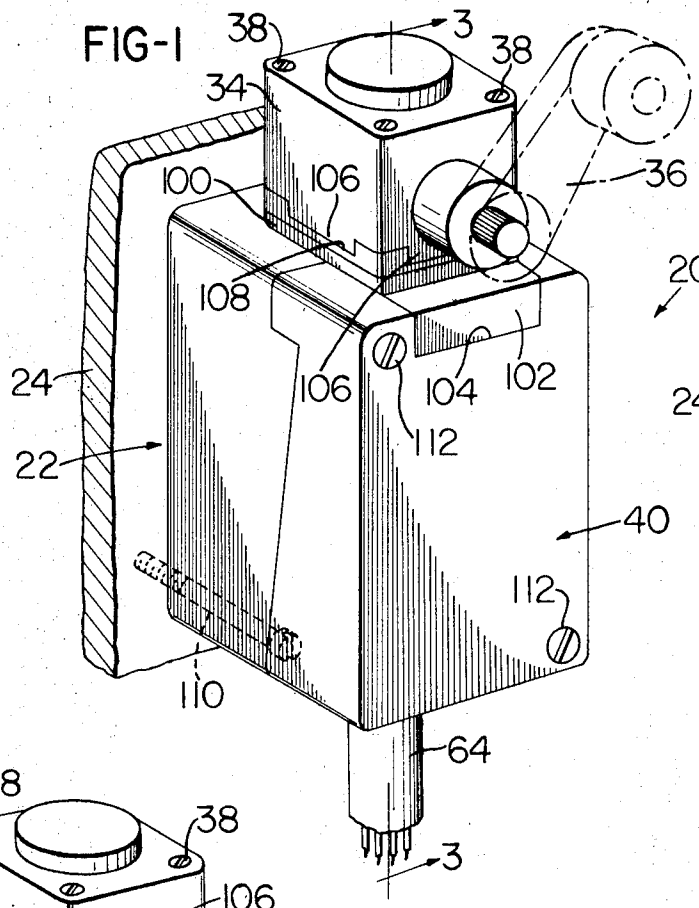
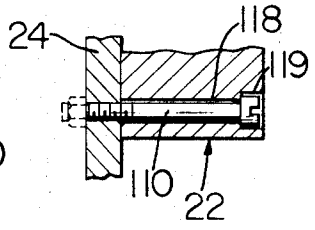


FIG-7



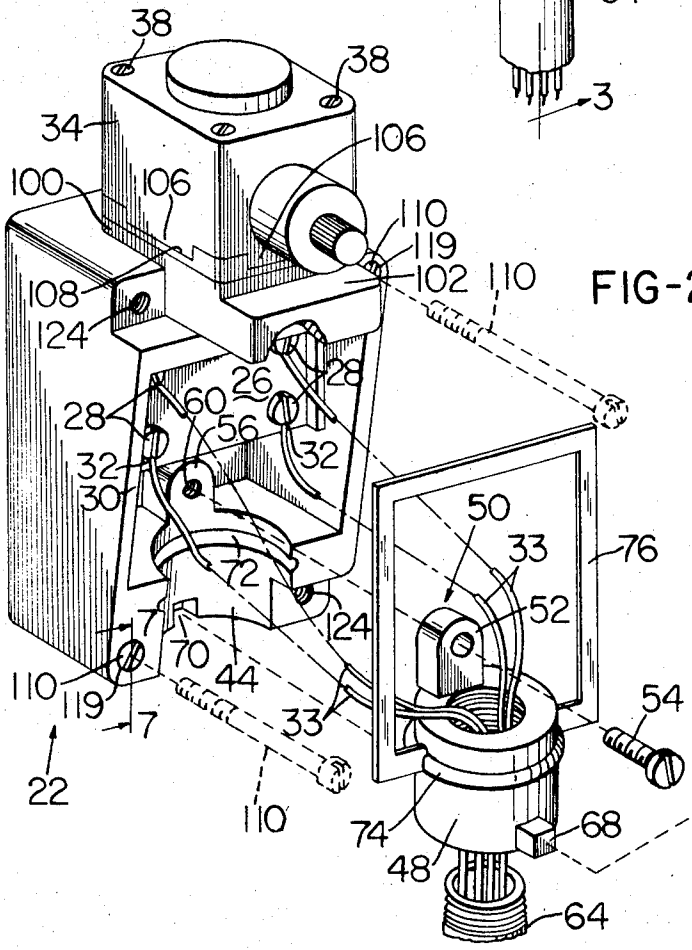
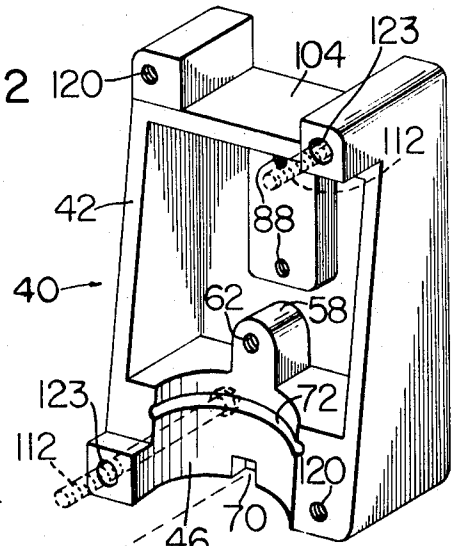


FIG-2



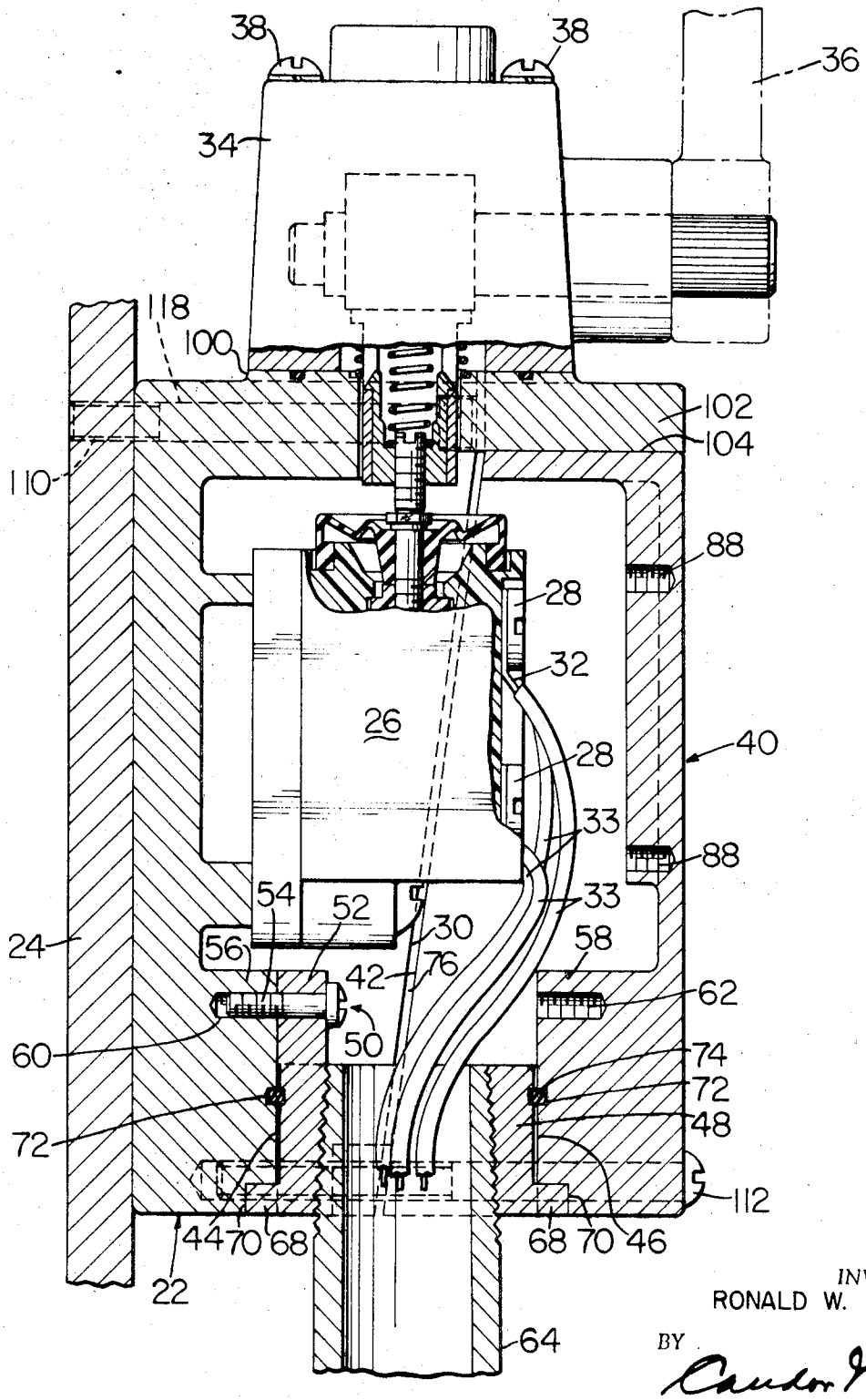
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FIG-3



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FIG-6

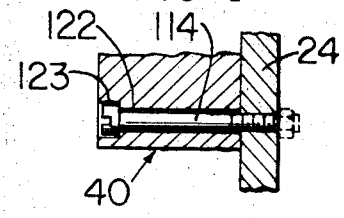
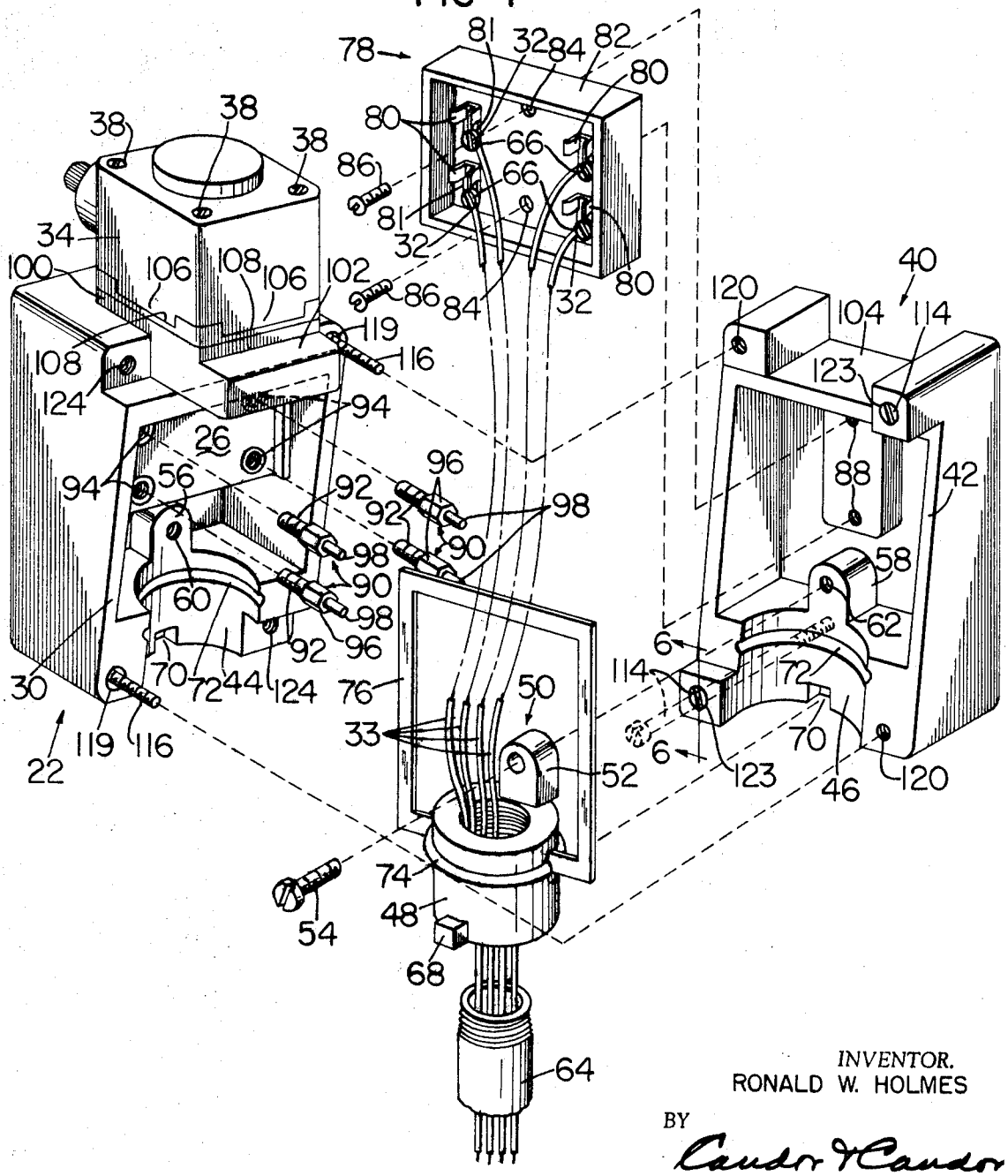


FIG-4



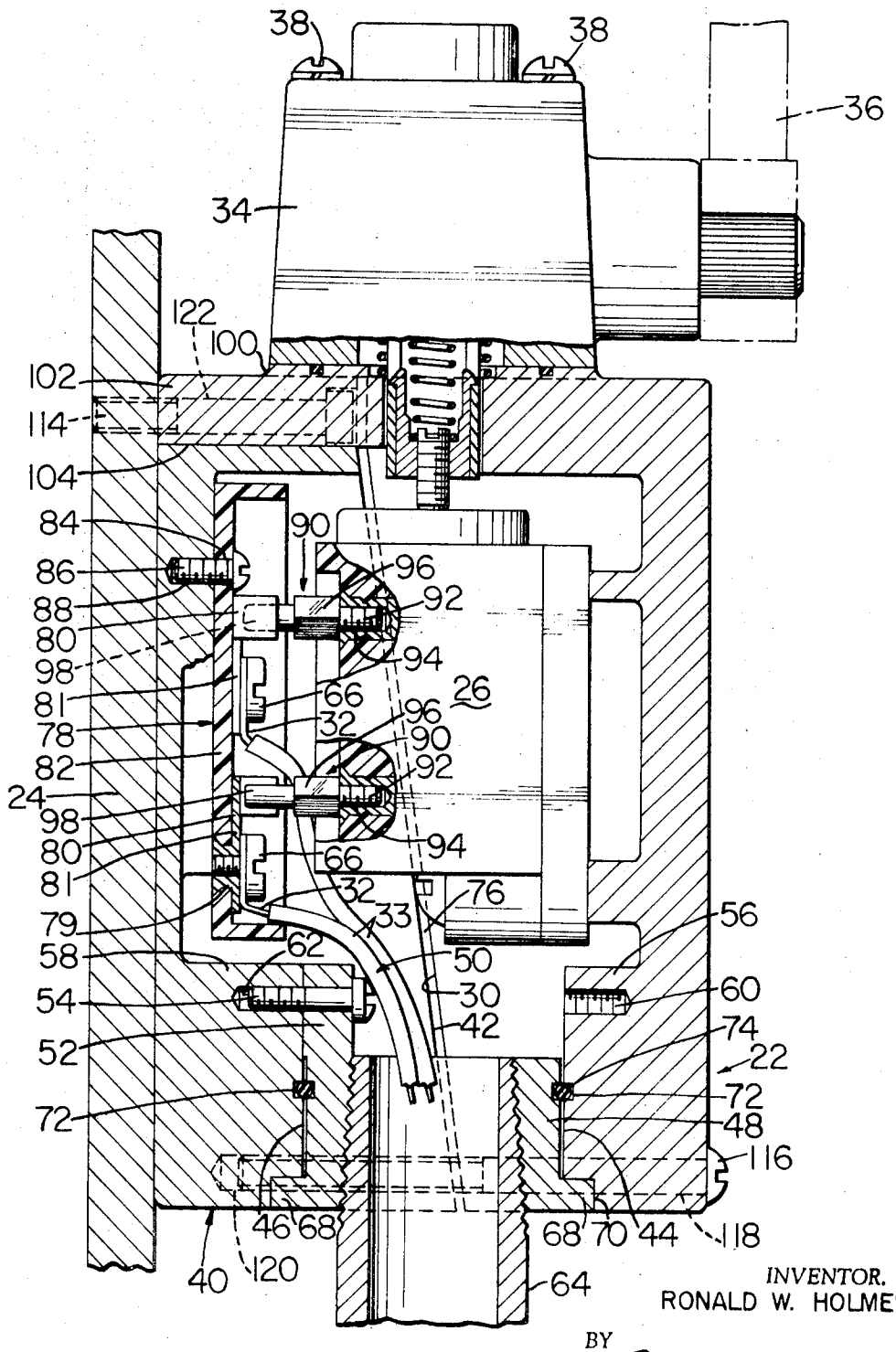
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FIG-5



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REVERSIBLY MOUNTABLE LIMIT SWITCH CONSTRUCTION

This invention relates to a reversibly mountable limit switch construction.

One of the features of this invention includes a reversibly mountable limit switch construction including a switch-supporting member or casing and a switch cover member or casing either of which may be mounted on a support and the other of which may be used as a cover to form a reversibly mountable limit switch construction.

Another feature of this invention includes a limit switch construction according to the preceeding feature in which the switch-supporting member or casing is cup shaped with an open rim, and the switch cover member or casing is also cup shaped with an open rim, so that such members or casings may be united rim to rim with either casing being mountable on the support wall.

Another feature of this invention includes a limit switch construction in which each of the cup-shaped members or casings has a notch portion to receive the powerlines, and so that the powerline terminals may be attached to the switch means in the switch support casing when such casing is to be attached to the support, or so that the powerline terminals may be attached to plug-in prong receptacle means on the other casing when such casing is to be attached to the support.

Another feature of this invention includes the use of a single powerline conduit-receiving fitting with the two members or casings.

Another feature of this invention includes a limit switch construction in which the standard switch support casing may be mounted on the support and be covered by the switch cover casing, or the switch cover casing may be quickly changed to a plug-in casing and be mounted on the support and be covered by the standard switch support casing.

Other features of this invention are apparent from this description, the appended claimed subject matter, and/or the accompanying drawings, in which:

FIG. 1 is a diagrammatic perspective view of the limit switch construction of this invention, with the switch support casing secured to the support surface, and with the switch cover casing secured to the switch support casing.

FIG. 2 is a diagrammatic exploded view of the limit switch construction shown in FIG. 1.

FIG. 3 is a diagrammatic vertical cross section taken generally along line 3–3 of FIG. 1.

FIG. 4 is a view similar to FIG. 2 with the switch cover casing to be supported on the support surface, and showing the detachable parts to be used or omitted, as desired.

FIG. 5 is a view similar to FIG. 3 with the parts reversed and showing the switch cover casing secured to the support surface and the switch support casing secured to the switch cover casing.

FIG. 6 is a detailed cross section taken along the line 6–6 of FIG. 4 showing a typical screw mount construction for mounting the casing on the support.

FIG. 7 is a view similar to FIG. 6 taken along the line 7–7 of FIG. 2.

Certain words are used in this application to indicate direction, relative position, and the like. Such words are used for the sake of brevity and clearness. Such words are used only in connection with the views of the drawings. In actual use, the parts described by such words may have entirely different direction, relative position, and the like. Examples of such words are "vertical," "horizontal," "upper," "lower," etc.

A limit switch construction **20**, and the like, according to this invention, may include a combined surface mount and cover-forming switch support member or casing **22** to be selectively mounted on a supporting surface **24**, as in FIGS. **1** and **3**, and to be used as a cover when not to be mounted on such support surface **24**, as shown in FIG. **5**.

Such switch support member or casing **22** may have an insulated switch means **26** mounted thereon. Such switch means **26** may have any number of powerline terminal fasteners or screws **28**.

The switch support member or casing **22** may be a cup-shaped casing **22**, having a cover-receiving casing rim **30** through which the fasteners **28** may be manipulated when the powerline terminals **32** of the powerlines **33** are to be secured thereto.

An operator head **34** may be selectively rotatably mounted on the switch support member or casing **22** selectively to adjust the switch means **26** to on and off positions, and the like, by the manipulation or actuation of the handle, or actuating arm **36**. The operator head **34** may be rotatably mounted in a plurality of positions by means of the screws **38**.

A combined surface mount and cover-forming switch cover member or casing **40** may be selectively mounted on a supporting surface **24**, as a surface mount member or casing, as in FIGS. **4** and **5** and may be covered by the said switch support member or casing **22** when member or casing **22** is used as a cover. Alternatively, the switch cover member or casing **40** may be used as a cover to cover the switch support member or casing **22** when the member or casing **22** is attached to the support **24**, as in FIGS. **1**—**3**.

Such switch cover member or casing **40** may be a cup-shaped casing having a switch cover casing rim **42** to engage the switch support casing rim **30** when the two casings **22** and **40** are secured together as shown in FIGS. **3** and **5**.

The switch support member or casing **22** may have a notch **44** at the bottom, which is a powerline conduit fitting receiving switch support casing notch or notch means **44**. The switch cover member or casing **40** may also have a notch **46** at the bottom, which is a powerline conduit fitting receiving switch cover casing notch or notch means **46** to mate with the said notch or notch means **44**.

A powerline conduit receiving fitting **48** may have detachable attaching means **50** for selectively detachably securing the fitting **48** to said switch support member or casing **22**, as in FIG. **3**, and to said switch cover member or casing **40**, as in FIG. **5**. Such attaching means **50** may include a boss or ear **52** and screw **54** on the fitting **48** so that the fitting **48** may be selectively attached to the members or casings **22** or **40** by insertion of the screw **54** into the threaded opening of the casing boss or ear **56** of member or casing **22**, or into the threaded opening of the casing boss or ear **58** of casing **40**, such threaded openings being respectively indicated at **60** and **62**.

The fitting **48** may receive and have threadedly secured thereto a powerline conduit **64** which may contain the powerlines **33** which have terminals **32** to be attached respectively to the terminal fasteners or screws **66** of the member or casing **40**, to be further described.

Such fitting **48** may have one or a pair of bosses **68** to be received in notches **70** on members or casings **22** and **40**, respectively. The fitting **48** and the members or casings **22** and **48** may have seal or O-ring-receiving grooves **72** to receive the seal or O-ring **74**. Another seal **76** may be provided to be received between the mating rims **30** and **42** of the members or casings **22** and **40**.

The construction is such that the powerline conduit **64** and fitting **48** may be secured to the switch support member or casing **22**, when such casing **22** is to be secured to the support surface **24**, as a surface mount casing, as in FIGS. **1**, **2** and **3**. Also, the conduit **64** and fitting **48** may be secured to the switch cover member or casing **40**, when such casing **40** is to be secured to the support surface **24** as a surface mount casing, as in FIGS. **4** and **5**.

Prong receptacle means **78** may be attached to the switch cover member or casing **40**. Such means **78** may have individual prong receptacles or prong receiving forks **80** to which individual terminal fasteners or screws **66** are electrically conductively connected by fork support members **81** to connect the prong receptacle means **78** and individual receptacles or forks **80** to the powerline terminals **32** of the powerlines **33** which pass through the fitting **48**. The fork support members **81** may include internally threaded screw-receiving sockets **79** which are embedded in the insulative plastic box **82**.

The prong receptacle means 78 may include the insulative plastic box 82 in which the individual prong receptacles or forks 80 are mounted. Such box 82 may have screw holes 84 through which the screws 86 may be inserted and be threadedly secured in threaded screw holes 88 in member or casing 40, to secure the box 82 in the casing 40.

Such prong receptacle means 78 is detachably attached to the switch cover member or casing 40, as above-described, so that such prong receptacle means 78 need not be attached to such member or switch member or switch cover casing 40 when the switch support casing 22 is to be secured to a support surface 24, as in FIG. 3.

Prong means 90 are attachable to the switch means 26 to be used when the switch cover member or casing 40 is to be secured to a support surface as a surface mount casing, as in FIGS. 4 and 5. Such prong means are detachably attached to the switch means 26 by removing the terminal fasteners or screws 28 of FIGS. 2 and 3 and inserting the threaded ends 92 of the prong means 90 in the vacated threaded openings 94 of the switch means 26, as in FIGS. 4 and 5. The prong means 90 may include a turnable or hexagonal portion 96, which may be turned by a suitable tool if desired. Such prong means 90 may also include the insertable prong portions 98, which are insertable into the individual prong receiving forks 80 of the prong receptacle receiving box 82.

Any type of suitable switch means 26 may be used that is capable of cooperating with the other parts herein described. For example, the switch means disclosed in the patent to W. R. Bauer, U.S. Pat. No. 3,317,697, patented May 2, 1967 may be used with the present invention.

Any type of selectively rotatably mountable operator head 34 may be used, which may be mounted in different positions on the switch support member or casing 22 and which has a manipulator, actuator, arm, or handle 36 to adjust the switch means 26. For example, the operator head and cooperating parts may be used which are disclosed in the patent to W. J. Russell, U.S. Pat. No. 3,252,345, patented May 24, 1966.

In mounting the operator head 34 on the switch support member or casing 22, the head 34 may be mounted on a platform 100 which may be secured to, or be integral with, the casing 22. Such platform 100 may have an integral extension 102 which may be received in the channel 104 which is formed in the switch cover member or casing 40.

The head 34 may have extensions or tongues 106 which are received and locked in channels 108 which are formed in the platform 100.

Surface mounting means and covering fastening means may be provided selectively to secure said switch support member or casing 22 to a support surface 24 and said switch cover member or casing 40 to said switch support member or casing 22 when said switch support member or casing 22 is to be secured as a surface mount member or casing, as shown in FIGS. 1, 2 and 3. Such surfaces mounting means may include mounting screws or bolts 110 for securing or mounting the member or casing 22 on the mounting surface 24. Such screws 110 may be screwed into or bolted to the surface 24 as shown in FIG. 7. Thereafter the powerline terminals 32 may be secured to the terminal fasteners 28, FIGS. 1—3. The covering fastening means may include covering screws 112 to secure the switch cover member casing 40 to the switch support member or casing 22 after the powerline terminals 32 have been secured to the fasteners 28.

Surface mounting means and covering fastening means may also be provided selectively to secure the switch cover member or casing 40 to the support surface 24 and the switch support member or casing 22 to said switch cover member or casing 40, when said switch cover member or casing, as shown in FIGS. 4 and 5. Such surface mounting means may include mounting screws or bolts 114 for securing or mounting the member or casing 40 on the mounting surface 24 as shown in FIG. 6. Thereafter the powerline terminals 32 may be secured to the terminal fasteners 66, FIGS. 4 and 5. The covering fastening means may include covering screws 116 to secure the switch support member or casing 22 to the switch cover member or casing 40, after the powerline terminals 32 have been secured to the fasteners 66.

The mounting screws or bolts 110 FIGS. 1—3 and 7 are inserted in the openings 118 with their screw heads countersunk in enlarged head receiving portions 119, FIG. 7, of unthreaded openings 118, and with the threaded screw ends in the mounting surface 24 or to a nut, as desired. The aligned threaded openings 120 of member or casing 40 remain idle as long as the member or casing 22 is the surface-mounted member casing. The covering screws 112, FIGS. 1—3 are inserted in the unthreaded opening 122, of member or casing 40 and into aligned threaded openings 124 of member or casing 22.

The mounting screws 114 or bolts 114, FIGS. 4, 5 and 6 are inserted in unthreaded openings 122 with their screw heads countersunk in enlarged head-receiving portions 123 of unthreaded openings 122, FIG. 6, and with the threaded screw ends in the mounting surface 24 or attached to a nut, as desired. The aligned threaded openings 124 of member or casing 22 remain idle as long as the member or casing 40 is the surface mounted member or casing. The covering screws 116, FIGS. 4 and 5, are inserted in the unthreaded openings 118 of member or casing 22 and into the aligned threaded openings 120 of member or casing 40.

The powerline conduit receiving fitting 48 is secured to the notch portion 44 of member or casing 22 when such casing is to be the surface mounted casing, as in FIGS. 1—3. Such fitting is secured to the notch portion 46 of member or casing 40 when such casing is to be the surface mounted casing, as in FIGS. 4 and 5.

In the operation of this invention, when the switch-supporting member or casing 22 is to be the surface-mounted casing, as in FIGS. 1—3 and 7, the fitting 48 is secured to the notch portion 44 by screw 54, and the member or casing 22 is mounted on the support or surface a 24 by mounting screws 110 in unthreaded openings 118, FIG. 6. The conduit 64 may be attached to the fitting 48, and the powerline terminals 32 may be secured to the fasteners 28. Then the switch-covering member or casing 40 is placed over the mounted member or casing 22, rim-to-rim, with gasket 76 between. Then the member or casing 40 is secured in place by covering screws 112 in unthreaded openings 122 and aligned threaded openings 124.

When the switch-covering member or casing 40 is to be the surface mounted casing, as in FIGS. 4, 5 and 6, the fitting 48 is secured in the notch portion 46 by screw 54, and the member or casing 40 is mounted on the support or surface 24 by mounting screws 114 in unthreaded openings 122, FIG. 6. The conduit 64 may be attached to the fitting 48, and the powerline terminals 32 may be secured to the fasteners 66. Then the switch support member or casing 22 is placed over the mounted member or casing 40, rim to rim, with the gasket 76 between them, if desired. Then the member or casing 22 is secured in place by covering screws 116 in unthreaded openings 118 and aligned threaded openings 120.

The prong receptacle means 78 and the prong means 90 are installed in their proper places in members or casings 40 and 22 respectively before such members or casings are used in the installation of FIGS. 4 and 5, but need not be used for the installation of FIGS. 1—3, the prong means 90 and receptacle means 78 being removed or not used for the installation of FIGS. 1—3.

The interiors of the combined casing 22, 40, and of the switch means 26 are hermetically sealed from the outside atmosphere by the seals herein disclosed and additionally disclosed in the Bauer and Russell patents.

A new, useful, and unobvious reversibly mountable limit switch construction has thus been provided.

While the form of the invention now preferred has been disclosed as required by statute, other forms may be used, all coming within the scope of the claimed subject matter which follows:

I claim:

1. In combination:

a combined cup-shaped surface mount and cover-forming switch support casing having an opening forming switch support casing rim, and having a powerline conduit fitting receiving switch support casing notch;

insulated switch means mounted in said switch support casing and having switch support casing powerline terminal fasteners manipulatable through said switch support casing rim;

an operator head selectively rotatably mounted on said switch support casing selectively to adjust said switch means;

a combined cup-shaped surface mount and cover-forming switch cover casing having a switch cover casing rim engaging said switch support casing rim, and having a powerline conduit fitting receiving switch cover casing notch mating with said switch support casing notch;

a powerline conduit receiving fitting disposed in said mating notches and having detachable attaching means detachably securing said fitting to said switch support casing to be adapted to secure a powerline conduit to said switch support casing;

said switch support casing having mounting means adapted to secure said switch support casing to a support surface and having covering fastening means securing said switch cover casing to said switch support casing.

2. In combination:

a combined surface mount and cover-forming switch support member adapted to be mounted on a supporting surface;

a combined surface mount and cover-forming switch cover member adapted to be mounted on a supporting surface;

said switch support member having a powerline conduit receiving fitting switch support member notch means;

insulated switch means mounted on said switch support member;

an operator head selectively rotatably mounted on said switch support member selectively to adjust said switch means;

said switch cover member having means covering said switch means and having a powerline conduit receiving fitting switch cover member notch means mating with said switch support member notch means;

a powerline conduit receiving fitting disposed in said mating notches and having detachable attaching means detachably securing said fitting to one of said switch support member and said switch cover member to be adapted to secure a powerline conduit to said one switch member; and

securing said switch support member to said switch cover member.

3. A combination according to claim 1 in which said fitting detachable attaching means includes a boss on said fitting and a screw on said boss threaded into a threaded opening in a boss on said switch support casing.

4. In combination:

a combined cup-shaped surface mount and cover forming switch support casing having an opening forming switch support casing rim, and having a powerline conduit fitting receiving switch support casing notch;

insulated switch means mounted in said switch support casing and having prong means;

an operator head selectively rotatably mounted on said switch support casing selectively to adjust said switch means;

a combined cup-shaped surface mount and cover-forming switch cover casing having a switch cover casing rim engaging said switch support casing rim, and having a powerline conduit fitting receiving switch cover casing notch mating with said switch support casing notch;

a powerline conduit receiving fitting disposed in said mating notches and having detachable attaching means detachably securing said fitting to said switch cover casing to be adapted to secure a powerline conduit to said switch cover casing;

prong receptacle means interconnected to said switch prongs and attached to said switch cover casing, said prong receptacle means having powerline terminal fasteners adapted to connect said prong receptacle means to powerline terminals of powerlines passing through said fitting;

said switch cover casing having fastening means securing said switch cover casing to said switch support casing, said switch cover casing having mounting means adapted to secure said switch cover casing to a support surface.

5. A combination according to claim 21 in which said prong receptacle means includes an insulative plastic box with detachable attaching means attaching said box to said switch cover casing, said box having individual prong-receiving forks carried by and conductively connected by fork support members with internally threaded screw-receiving sockets embedded in said plastic box, and in which said powerline terminal fasteners of said prong receptacle means are terminal fastener screws threadedly received in said screw-receiving sockets.

6. A combination according to claim 22 in which said detachable attaching means for said box includes screws and screw holes in said box and in said switch cover casing.