



- (51) **International Patent Classification:**
m m 9/04 (2006.01) *m m* 13/533 (2006.01)
m 1H 73/20 (2006.01)
- (21) **International Application Number:**
PCT/US20 12/0654 18
- (22) **International Filing Date:**
16 November 2012 (16.1 1.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/569,726 12 December 201 1 (12. 12.201 1) US
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- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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- (54) **Title:** CIRCUIT BREAKER, CIRCUIT BREAKER TERMINAL LUG COVER, AND METHOD OF PROTECTING A TERMINAL LUG

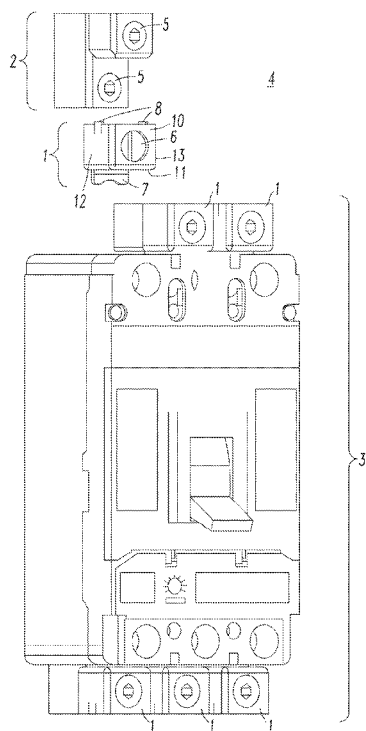


FIG.1

- (57) **Abstract:** A circuit breaker terminal lug cover (1) is structured to mechanically secure to a circuit breaker terminal lug (2) and protect the terminal lug from degradation or corrosion. The terminal lug includes a number of terminal lug screws (5) capable of securing a number of cables to the circuit breaker (3). The terminal lug cover includes a plurality of sides (10, 11, 12, 13) structured to carry heat away from the terminal lug or deflect ionized gases away from the terminal lug. At least one (12, 13) of the sides includes a number of securing members (8, 9) structured to mechanically secure the terminal lug cover to the circuit breaker terminal lug. One (10) of the sides includes an access hole (6) permitting access to the number of terminal lug screws.

(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.1 7(H))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.1 7(iii))

Published:

- with international search report (Art. 21(3))

- 1 -

CIRCUIT BREAKER, **CIRCUIT BREAKER** TERMINAL LUG COVER, AND
METHOD OF PROTECTING A TERMINAL LOG

CROSS REFERENCE TO RELATED APPLICATION

5 This application claims the benefit of U.S. Patent Application Serial
No. 61/569,726, filed December 12, 2011, which is incorporated by reference herein.

BACKGROUND

Field

10 The disclosed concept pertains generally to heat and corrosion
protection devices and, more particularly, to devices used to protect circuit breaker
terminals, terminal screw threads, connecting cables, and the like, from heat and
corrosion caused by high temperature gases. The disclosed concept further pertains to
circuit breakers. The disclosed concept also pertains to methods of protecting circuit
breaker terminals, terminal screw threads, connecting cables, and the like.

15 Background information

 Circuit breakers function to interrupt the flow of electric current when
an overload or short circuit is detected within a power circuit. When the circuit
breaker interrupts the overload or short circuit current, an arc is generated, which
creates exhaust gases of high temperature. These ionized exhaust gases can damage
20 the terminal lug of the circuit breaker by causing corrosion. Additionally, the heated
exhaust gases can damage the circuit breaker terminal lug by causing connecting
cables to melt onto the terminal lug. Corrosion of the terminal lug coupled with
melted cable material can damage terminal lug screw threads rendering the threads
and terminal lug unusable.

25 When the cabling connected to a circuit breaker melts onto the
terminal lug, such that removal thereof becomes difficult, it is standard practice to cut
the damaged cabling. Additionally, when circuit breaker terminal lugs have degraded
to such a degree that corrosion and cable melt have made the terminal lug and threads
therein unusable, it is standard practice to replace the terminal lug, or in some cases,
30 the entire circuit breaker. Information relevant to attempts to address these problems
are found in U.S. Patent No. 5,111,008. However, it is believed that the teachings

- 2 -

found in this Patent suffer **from** the fact that it is not easily adaptable **to interface** between a **commercial** circuit breaker and its terminal **lug**.

Also, several manufacturers of industrial circuit breakers have produced "terminal shields". These shields **are not to be confused with the device to**
5 **be described hereinbelow. In contrast to the device described by the disclosed**
concept, "terminal shields" lie between the internal phases of a circuit breaker and
protect each phase from the arc of another phase. it is believed that such terminal
shields fail to properly address or protect external circuit breaker terminal lugs and
connecting cables from such arcing events.

10 Consequently, a need exists **in** the art for a **method**, apparatus, and device capable **of preventing** such **terminal lug** degradation or **corrosion**.

There is room for improvement **in** circuit breakers.

There is also room for improvement in circuit breaker terminal **lugs**.

There is further room for improvement **in** methods **of protecting** circuit
15 breaker terminal lugs.

SUMMARY

These needs and others are met by embodiments of the disclosed concept in which a circuit breaker **terminal lug cover** protects a circuit breaker **terminal lug** and a number of **connecting** cables from degradation or **corrosion** (e.g.,
20 **without limitation, caused by heat and/or ionized exhaust gases**).

in accordance with one aspect of the disclosed concept, a circuit breaker terminal lug cover **is** structured **to mechanically** secure to a circuit breaker **terminal lug** and protect **the terminal lug** from degradation or corrosion, the **terminal lug** includes a **number** of **terminal lug screws** capable **of securing a number** of cables
25 **to the circuit breaker**. The **terminal lug cover** comprises: a plurality of sides structured to **carry** heat away from the terminal lug **or** deflect ionized gases away **from** the terminal lug, wherein **at least one** of the sides **includes a number** of securing members structured to mechanically secure the terminal lug cover to the circuit breaker terminal lug, and wherein one of the sides includes an access hole **permitting**
30 access to the number of terminal lug screws.

As another aspect of the disclosed concept, a circuit breaker apparatus comprises; a circuit breaker **comprising: a circuit breaker terminal lug including a**

- 3 -

number of terminal lug screws capable of securing a number of cables to the circuit breaker; and a circuit breaker terminal lug cover mechanically secured to the circuit breaker terminal lug in order to protect the terminal lug from degradation or corrosion, the terminal lug cover comprising; a plurality of sides structured to carry
5 heat away from the terminal lug or deflect ionized gases away from the terminal lug, wherein at least one of the sides includes a number of securing members mechanically securing the terminal lug cover to the circuit breaker terminal lug, and wherein one of the sides includes an access hole permitting access to the number of terminal lug screws.

10 The plurality of sides may be a front side, a bottom side, and two opposing sides each of which is coupled to the front and bottom sides. The terminal lug cover may fit snugly on a front side, a bottom side, and two opposing sides of the terminal lug in order that physical contact between the terminal lug cover and the terminal lug permits the terminal lug cover to conduct heat away from the terminal
15 lug and the number of cables or deflect ionized gases away from the terminal lug.

As another aspect of the disclosed concept, a method protects a circuit breaker terminal lug from degradation or corrosion. The circuit breaker terminal lug includes a number of terminal lug screws capable of securing a number of cables to a circuit breaker, and the circuit breaker includes a terminal lug. The method
20 comprises: mechanically securing a circuit breaker terminal lug cover to the circuit breaker terminal lug in order to protect the terminal lug from degradation or corrosion; providing the circuit breaker terminal lug cover with a plurality of sides structured to carry heat away from the terminal lug or deflect ionized gases away from the terminal lug; including with at least one of the sides a number of securing
25 members mechanically securing the terminal lug cover to the circuit breaker terminal lug; and providing one of the sides with an access hole permitting access to the number of terminal lug screws.

BRIEF DESCRIPTION OF THE DRAWINGS

30 A full understanding of the disclosed concept can be gained from the following description of the preferred embodiments when read in conjunction with the accompanying drawings in which:

- 4 -

Figure 1 is a **partially** exploded isometric view of an electrical circuit breaker, including a circuit breaker terminal lug and a terminal lug cover in accordance with **embodiments of the** disclosed concept.

5 Figure 2 is an exploded **isometric** view of the terminal lug and the terminal lug cover of Figure 1.

Figure 3 is a side profile view of a **fully assembled** terminal lug cover mechanically coupled to and assembled to the **terminal** lug of Figure 2.

Figure 4 is a front profile view of the **terminal** lug cover shown **mechanically** affixed and assembled to the **terminal** lug of Figures 1-3.

10 Figure 5 is a top plan view of the terminal lug cover affixed and assembled to the terminal lug of Figures 1-4.

Figure 6 is a top **plan view** of the terminal lug cover affixed to the terminal lug of Figure 5, except **magnified** to show details of the **terminal** lug and the terminal lug cover.

15 DESCRIPTION OF THE PREFERRED EMBODIMENTS

As employed herein, the term "number" shall mean **one** or an integer greater than one (i.e., a plurality).

As employed herein, the **statement** that two or more parts are **"connected"** or **"coupled"** or **"affixed"** together shall mean that the parts are joined together either directly or joined through one or more intermediate parts. Further, as
20 employed herein, the **statement** that two or more parts are "attached" shall mean that the parts are joined together directly.

As employed herein, the term "circuit breaker" shall mean any electrical switch or circuit **interrupter** that **interrupts the** flow of electrical **current in** an
25 **electrical** circuit upon the existence or **occurrence** of specified number of electrical/mechanical fault conditions, **and** that permits the flow of electric **current** in the electrical circuit under other conditions.

As employed herein, the term "circuit breaker terminal" shall mean a component of a circuit breaker that permits a number of cables of a circuit to connect
30 to the circuit breaker.

- 5 -

As **employed** herein, the term "circuit breaker terminal **lug**" or "terminal **lug**" shall mean a physical **component of a** circuit breaker having a **circuit** breaker terminal.

As employed herein, the term "hole" shall mean an opening through
5 **something; an area where something is missing; or an aperture through something.**

As employed herein, the **term** "access **hole**" shall **mean** a hole **through** or in something to access something else.

As **employed** herein, the term "screw" shall mean a **simple machine** of the inclined plane **type** consisting of a **spirally** grooved solid cylinder structured **to fit**
10 into a correspondingly grooved hollow cylinder; a nail-shaped **or rod-shaped** piece with a spiral groove structured to fit into a **correspondingly** grooved hollow material **by rotating; or a threaded** or spirally grooved fastener **structured to fit into a** correspondingly threaded **or** spirally grooved terminal lug by rotating.

As **employed** hereto, the term "cable" shall **mean a circuit** conductor
15 having a number **of individual** electrical conductors.

The disclosed concept provides advantageous apparatus and devices for protecting circuit breakers from failure, degradation, corrosion, and eventual replacement due to excessive heat resulting from **ionized** gases released during arcing events. The circuit breaker **terminal** lug covers described herein prolong the
20 operational lifetime of circuit breakers, and their connecting components. Using the apparatus and devices according to the disclosed concept, thermal energy and/or ionized **exhaust** gasses **are** efficiently **and** effectively conducted **away from** or deflected away from the circuit breaker and its connecting cables.

Figure 1 shows **an isometric view of one embodiment of an electrical**
25 circuit breaker 3, including a circuit breaker terminal lug 2 and a **terminal** lug cover 1. The electrical circuit breaker 3, a number of the circuit breaker **terminal** lugs 2 and a number of the terminal lug covers 1 **form** a circuit breaker apparatus 4. The example circuit breaker 3 includes six example circuit breaker terminals, although the **disclosed** concept **is applicable** to circuit **breakers** having any suitable **number** of
30 circuit breaker **terminals**. As shown in the embodiment of Figure 1, three **terminals** are on a top (**with respect to** Figure 1) portion of the circuit breaker 3, and three **terminals** are on a bottom (**with respect to** Figure 1) **portion** thereof. Five of the

- 6 -

circuit breaker terminals are shown as being assembled, having a terminal lug cover 1 shown affixed to a terminal lug 2. The terminal lugs 2 (only one is shown in Figure 1, it being understood that each of the circuit breaker terminals includes a terminal lug 2) and associated and respective terminal lug covers 1 are shown as assembled with the circuit breaker 3 in five of the six terminal assemblies of Figure 1. A sixth terminal assembly of Figure 1 shows the terminal lug 2 and the terminal lug cover 1 in exploded fashion, shown in an "unassembled" arrangement (i.e., unassembled from the circuit breaker 3).

As shown in Figure 1, each terminal lug 2 includes a number of terminal lug screws 5 that are used to secure a number of circuit breaker cables (not shown) to each terminal lug 2. The terminal lug cover 1 includes an access hole 6 which allows for a screwdriver or similar tool (not shown) to tighten the number of terminal lug screws 5 to the number of cables (not shown). In one embodiment, as shown in Figure 1, the terminal lug cover 1 includes a lower flange 7 and securing clips 8. The lower flange 7 and securing clips 8 are used in assembling and affixing the terminal lug cover 1 to the terminal lug 2.

The terminal lug 2 can be made of copper, aluminum or any other suitable conductor for a circuit, such as a power circuit.

The terminal lug cover 1 can be made of a suitable thermoplastic material (e.g., without limitation, LEXAN[®] 500 10% glass filled V0 rated).

The terminal lug cover 1 advantageously couples to a portion of the terminal lug 2 external to the circuit breaker 3. The terminal lug 2 is removable from the circuit breaker 3. The upper (with respect to Figure 1) portion of the terminal lug 2 and the terminal lug cover 1 coupled thereto are both external to the circuit breaker 3. The terminal lug 2 electrically and mechanically connects to one of the line or load conductors (not shown) of the circuit breaker 4 via a terminal mounting screw (not shown).

Figure 2 shows an exploded isometric view of the terminal lug 2 and the terminal lug cover 1. As shown in Figure 2, the terminal lug 2 includes two terminal lug screws 5 used to secure a number of cables (not shown) to each terminal. The embodiment of Figure 2 further shows the terminal lug cover 1 including the securing clips 8. The securing clips 8 extend from a top (with respect to Figure 2)

- 7 -

portion of the terminal lug cover 1. In the embodiment shown, the terminal lug cover 1 includes the flange 7 extending therefrom. The access hole 6 is provided through the terminal lug cover 1 as shown in Figure 2. The access hole 6 permits access to a number of the terminal lug screws 5, which are in turn used to couple cabling (not shown) to a respective circuit breaker terminal (not shown) positioned within the circuit breaker.

Figure 3 shows a side profile view of the fully assembled terminal lug cover 1 mechanically coupled to and assembled to the terminal lug 2. In the embodiment shown in Figure 3, a side profile of the terminal lug 2 is visible. In this embodiment, the terminal lug cover 1 is snugly affixed to the terminal lug 2 via the top (with respect to Figure 3) securing clips 8 (only one securing clip 8 is shown in Figure 3). A profile view of the lower (with respect to Figure 3) flange 7 of the terminal lug cover 1 described above with reference to Figures 1 and 2 is shown in contact with a lower (with respect to Figure 3) half of the terminal lug 2. The terminal lug cover 1 fits snugly on a front side 16, a bottom side 17, and two opposing sides 18, 19 (shown in Figure 2) of the terminal lug 2 in order that physical contact between the terminal lug cover 1 and the terminal lug 2 permits the terminal lug cover 1 to conduct heat away from the terminal lug 2 and the number of cables (not shown) and/or deflect ionized gases away from the terminal lug 2.

Figure 4 is a front (with respect to Figures 1 and 4) profile view of the terminal lug cover 1 of Figures 1-3 shown mechanically affixed and assembled to the terminal lug 2 described above with reference to Figures 1-3. The embodiment of the terminal lug cover 1 shown in Figure 4 comprises four sides 10, 11, 12, 13, the securing clips 8 described above with reference to Figures 1-3, the lower (with respect to Figure 4) flange 7, and the access hole 6 located on the front (with respect to Figure 4) side 10 of the terminal lug cover 1. As described above with reference to Figures 1 and 2, the access hole 6 allows access to a number of the terminal lug screws 5 by a screwdriver or similar tool (not shown). As described above, the number of terminal lug screws 5 may be used to secure a number of connecting cables (not shown) to the terminal lug 2.

Figure 5 shows a top (with respect to Figures 1 and 5) plan view of the terminal lug cover 1 affixed and assembled to the terminal lug 2 described above with

- 8 -

reference to Figures 1-4. As shown in Figures 3-5, three 10,12,13 of the four sides 10,11,12,13 of the terminal lug cover 1 are shown affixed to the terminal lug 2. The securing clips 8 described above with reference to Figures 1-4 help secure the terminal lug cover 1 to the terminal lug 2. As shown in Figure 5, one embodiment of the terminal lug cover 1 also includes additional securing clips 9 that span the vertical (with respect to Figure i) length of the rear (with respect to Figure I) portion of the terminal lug cover 1. In this embodiment, the additional securing clips 9 help to further secure and mechanically affix the terminal lug cover 1 to the terminal lug 2. In one embodiment, the additional securing clips 9 interface with and couple to a chamfered edge 14 (a top portion of which is best shown in Figure 6) of the terminal lug 2 wherein the chamfered edge 14 is structured to mechanically couple to the additional securing clips 9.

Figure 6 is a top (with respect to Figures 1, 5 and 6) plan view of the terminal lug cover 1 affixed to the terminal lug 2 of Figure 5, except magnified to show the terminal lug cover 1 in more detail. In this embodiment, a top (with respect to Figure 1) portion of the terminal lug 2 is shown mechanically coupled to the terminal lug cover 1. Three 10,12,13 of the four sides 10,11,12,13 of the terminal lug cover 1 are in view, as well as the securing clips 8 and additional securing clips 9.

The disclosed terminal lug cover 1 protects the terminal lug 2 against relatively high temperature exhaust gasses after the circuit breaker 3 has interrupted the corresponding circuit (not shown). The terminal lug cover 1 protects against erosion of the terminals of the terminal lugs 2 from melted terminal material caused by high temperature gases exiting the circuit breaker 3. Since terminals and lug screw threads can otherwise be damaged to a point where the cabling would need to be cut in order to change out the product, the disclosed solution can help avoid potentially costly repairs, beyond a simple circuit breaker replacement.

The disclosed terminal lug cover 1 assembles to the profile of the circuit breaker terminal lug 2, with securing clips 8 and/or 9 to hold the cover in position. The cover 1 allows access to a number of the circuit breaker terminal lug screws 5 in order to connect cabling. The cover 1 then deflects ionized gases away from the body of the terminal lug 2.

- 9 -

In view of what is described above, one skilled in the art will understand that the embodiments of the assembly thus far described comprise the circuit breaker 3, the circuit breaker terminal lug 2, and the terminal lug cover 1. One embodiment of the disclosed concept utilizes a terminal lug cover, such as 1, having four sides 10, 11, 12, 13 with the lower (with respect to Figure 1) flange 7 and the top (with respect to Figure 1) securing clips 8 as well as the rear (with respect to Figure 1) securing clips 9 and the circular hole 6 in the face allowing for the terminal lug screw 5 to pass through and connect to the terminal. The characteristics of the terminal lug cover 1 function to attach securely to the terminal lug 2 and carry heat away from the terminal lug 2 and connecting cables (not shown) through physical contact and/or function as a shield and deflect ionized gases away from the terminal lug 2. The gases deflect off of the shield, thereby preventing the heat of the gases from melting the terminal's material and the cable's insulative conductor material. Preferably, the material of the terminal lug cover 1 includes a suitable fire retardant component (e.g., without limitation, a V0 fire retardant component).

One skilled in the art may find advantages by using a mechanism different than the securing clips 8 and/or 9 to fasten the terminal lug cover 1 to the terminal lugs 2. One skilled in the art may also find advantages by using a different type of hole than the circular hole 6 on the front (with respect to Figure 1) side 10 of the terminal lug cover 1 to permit the terminal lug screw 5 to pass through such cover. One skilled in the art may also find advantages by using more or fewer sides for the terminal lug cover 1. One skilled in the art may also find advantages by changing the shape and orientation of the flange 7 such that it may not exist at all, or in the alternative, may extend the full length of the lower (with respect to Figure 1) half of the terminal lug 2, while containing an additional access hole or terminal lug screw pass-through feature (not shown).

According to several embodiments, the disclosed concept will extend the life of circuit breaker terminal lugs and connecting cables (not shown) by protecting against degradation and/or corrosion from heat, ionized exhaust gasses or connecting cable melt. These advantageous characteristics of the terminal lug cover 1 will result in substantial cost savings in circuit breaker maintenance.

~ 10 ~

What **has** been shown is **the circuit** breaker terminal **lug** cover 1. While the **terminal lug** cover 1 has been **described** through specific embodiments and applications **thereof**, it is **understood** that numerous modifications and variations could be made **thereto by those** skilled in the art without **departing** from the spirit and
5 scope of the disclosed concept. It is therefore understood that within the scope of the claims, the disclosed concept may be practiced **otherwise** than specifically described herein.

Accordingly, it is **to be -understood** that the disclosed concept is not **to** be limited by the **specific illustrated embodiments**, but only by the **scope of the**
10 **appended claims**. The **description** may provide **examples of similar features** as are recited in the claims, but it should not be assumed **that** such similar **features** are identical to those in the **claims** unless such identity is essential to **comprehend** the scope **of the** claim. In some instances, the intended distinction between claim **features** and **description** features is **underscored by** using slightly **different** terminology.

15 The disclosed concept is described in association with a molded case circuit breaker, although the disclosed concept is applicable to a wide range of circuit breakers,

While specific **embodiments** of the disclosed concept have been described in detail, it **will** be appreciated by those skilled in the art that various
20 modifications and alternatives to those details could be developed in light of the overall teachings of the disclosure. Accordingly, the particular arrangements disclosed are meant to be illustrative **only** and not **limiting** as **to** the scope **of the disclosed concept which is to be given the full breadth of the claims appended** and any and all **equivalents** thereof.

~ 11 ~

What is Claimed is:

1. A circuit breaker terminal lug cover (1) structured to mechanically secure to a circuit breaker terminal lug (2) and protect the terminal lug from degradation or corrosion, the terminal lug including a number of terminal lug screws (5) capable of securing a number of cables to the circuit breaker, said terminal lug cover comprising:

a plurality of sides (11,12,13,14) structured to carry heat away from the terminal lug or deflect ionized gases away from the terminal lug,

wherein at least one (12,13) of the sides includes a number of securing members (8,9) structured to mechanically secure the terminal lug cover to the circuit breaker terminal lug, and

wherein one (13) of the sides includes an access hole (6) permitting access to the number of terminal lug screws.

2. The circuit breaker terminal lug cover (1) of Claim 1 wherein the number of securing members are a plurality of securing clips (8,9) structured to couple to a top portion or a rear portion of the terminal lug.

3. The circuit breaker terminal lug cover (1) of Claim 2 wherein the plurality of securing clips (9) are further structured to span and couple to a vertical length of the rear portion of the terminal lug.

4. The circuit breaker terminal lug cover (1) of Claim 3 wherein the vertical length of the rear portion of the terminal lug is a chamfered edge (14); and wherein the plurality of securing clips are further structured to mechanically couple to the chamfered edge.

5. A circuit breaker apparatus (4) comprising:
a circuit breaker (3) comprising:
the circuit breaker terminal lug (2) of Claim 1; and
the circuit breaker terminal lug cover (1) mechanically secured to the circuit breaker terminal lug.

6. The circuit breaker apparatus (4) of Claim 5 wherein the plurality of sides are four sides (10,11,12,13); and wherein the number of securing members are a plurality of securing clips (8,9) that couple the terminal lug cover to the terminal lug.

- 12 -

7. The circuit breaker apparatus (4) of Claim 5 wherein the plurality of sides are a front side (10), a **bottom** side (11), and two **opposing** sides (12,13) each of which is coupled to the front and bottom sides; wherein the **terminal lug** cover fits snugly on a front side (16), a **bottom** side (17), and two opposing sides (18,19) of the terminal lug in order (hat physical contact between the terminal lug cover and the terminal lug permits the terminal log cover to **conduct** heat away from the terminal lug and the number of cables or deflect ionized gases away from the ienninal lug.

8. The circuit breaker apparatus (4) of Claim 5 wherein the number of securing members are a **plurality** of securing clips (8,9) coupled to a top portion or a rear portion of the terminal iug.

9. The circuit breaker apparatus (4) of Claim 5 wherein the plurality of **securing** clips (9) further span and **couple** to a vertical length of the rear portion of the **terminal lug**; wherein the vertical length of the rear portion of the **terminal** lug is a chamfered edge (14); and wherein the plurality of **securing** clips mechanically couple to the chamfered edge.

10. The circuit breaker apparatus (4) of Claim 5 wherein said **terminal** lug cover is coupled to a portion of said terminal lug external to said circuit breaker; wherein said terminal lug is removable from said circuit breaker; and wherein the portion of said terminal lug and said **terminal** lug cover coupled thereto are both external to the circuit breaker.

11. A method of protecting a circuit breaker terminal lug (2) from degradation or **corrosion**, said circuit breaker **terminal** lug **including** a number of **terminal lug** screws (5) capable of **securing** a number of cables to a circuit breaker (3), said circuit breaker mcmding a terminal iug (2), said method comprising;

mechanically securing a circuit breaker **terminal** lug cover (1) to the circuit breaker terminal lug in order to protect the terminal lug from degradation or corrosion;

providing said circuit breaker terminal lug **cover** with a plurality of sides (10,11,12,13) **structured** to carry heat away from the terminal log or deflect ionized gases away from the terminal iug;

- 13 -

including with at least one (12, 13) of the sides a number of securing members (8,9) mechanically securing the terminal lug cover to the circuit breaker terminal lug; and

providing one (10) of the sides with an access hole (6) permitting access to the number of terminal log screws.

12. The method of Claim 11 further comprising:

coupling the **terminal** lug cover to the terminal lug with a plurality of **securing** clips (8,9) from a **number (12,13)** of said **plurality of sides**.

13. The method of **Claim 12** **further** comprising:

coupling (8,9) the terminal lug cover to a top portion or a rear portion of the terminal lug.

14. The method of Claim 11 further comprising:

providing four sides (10, 11, 12, 13) as said plurality of sides;

snugly fitting the terminal lug cover on a front (16), **a bottom** (17), **and** two sides (8, 19) of the **terminal** lug with said four sides; and

conducting heat away from the terminal lug and said **number** of cables **from** physical contact between the terminal lug and the terminal lug, or deflecting ionized gases away from the **terminal** lug.

15. The method of Claim 12 further comprising:

coupling the **plurality** of securing clips (9) to a rear portion of the terminal lug;

spanning and coupling the **plurality** of securing clips to a vertical length of the rear portion of the terminal lug;

providing the vertical length **of the** rear portion **of the** terminal lug with a chamfered edge (14); and

mechanically coupling the plurality **of securing** clips (9) to the chamfered edge.

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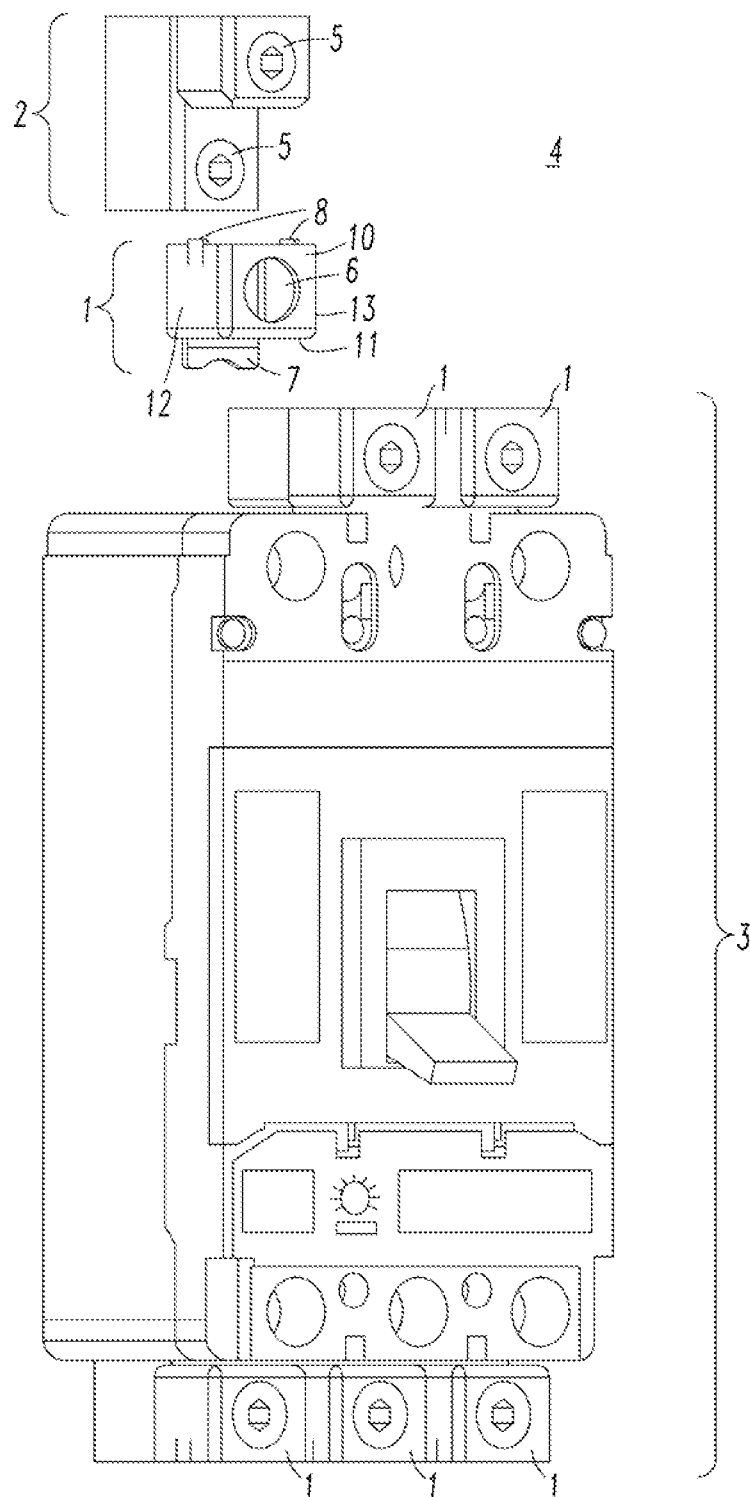


FIG. 1

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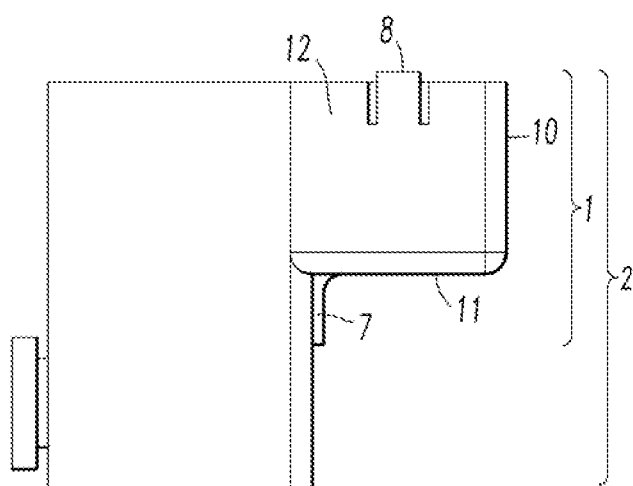
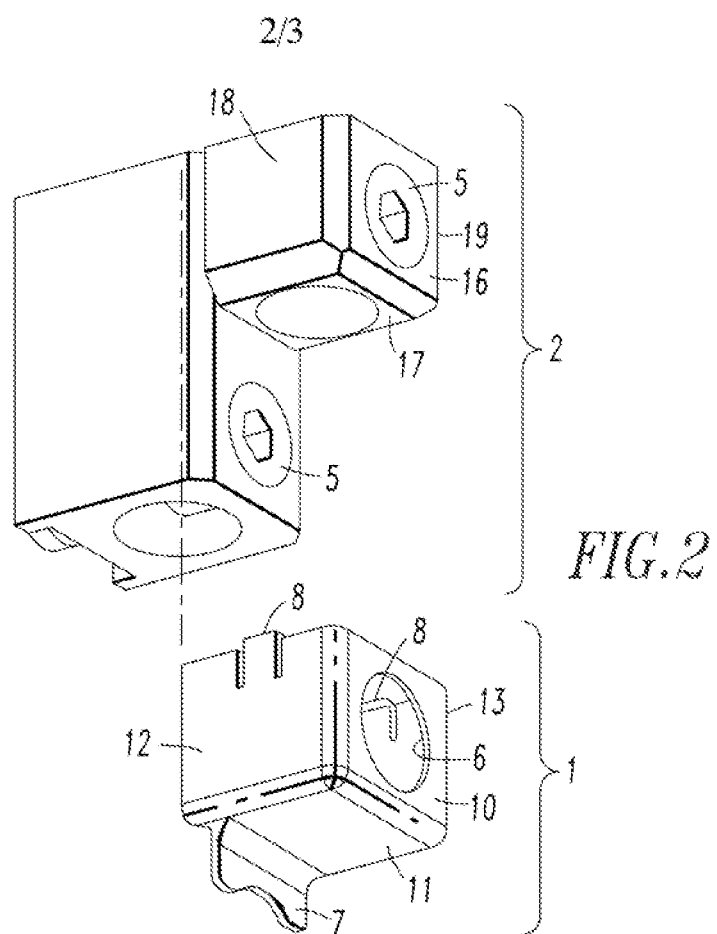


FIG. 3

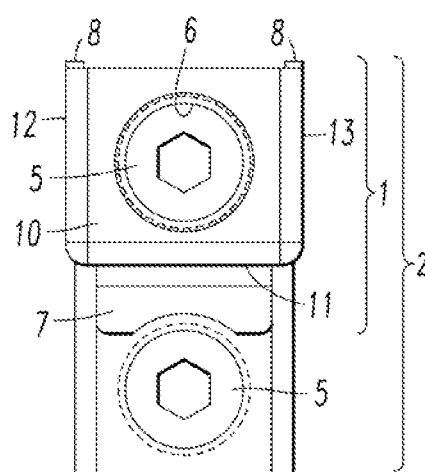


FIG. 4

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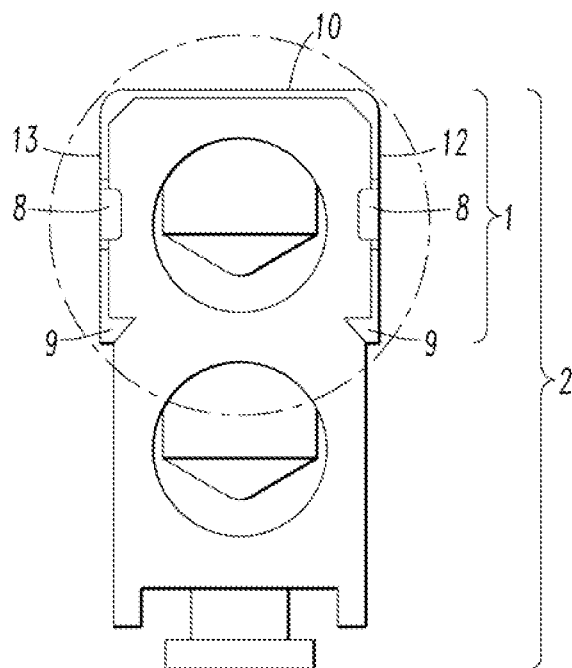


FIG. 5

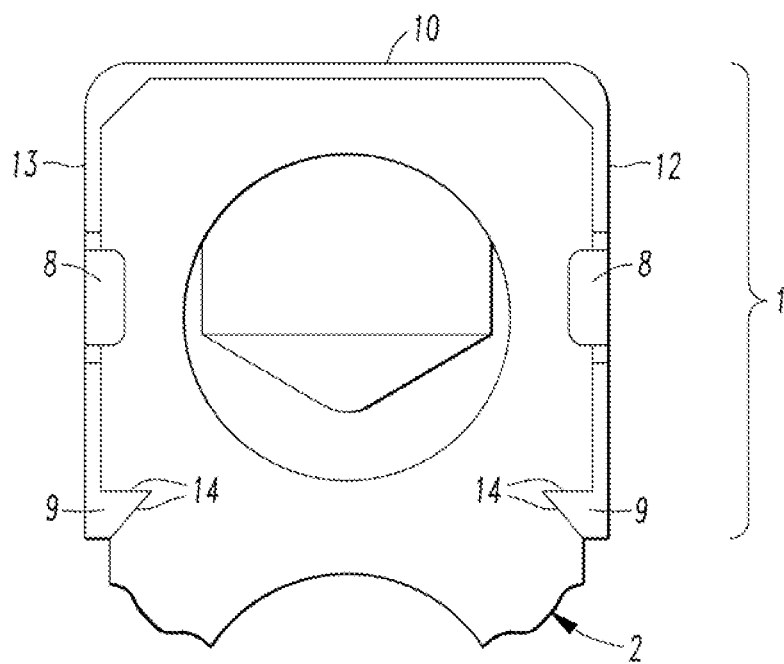


FIG. 6

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/065418

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01H9/Q4 H01H73/2Q
ADD. H01R13/533

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01H H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal , WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/057333 AI (SUBRAMANIAN ANANTHRAM [IN] ET AL) 17 March 2005 (2005-03-17) paragraphs [0002] , [0020] - [0023] figures 1,3,5 -----	1,5,7 , 10, 11, 14
X	US 2008/074217 AI (DUCHROW ROBERT A [US] ET AL) 27 March 2008 (2008-03-27) paragraphs [0016] - [0022] pages 1-5 -----	1,5, 10, 11
X	US 6 211 759 BI (LITTLE DAVID E [US] ET AL) 3 April 2001 (2001-04-03) column 2, line 33 - column 3, line 58 figures 1-4 ----- -/--	1,5, 11



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

11 February 2013

Date of mailing of the international search report

11/03/2013

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/065418

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 620 076 A (MRENN A STEPHEN A [US] ET AL) 28 October 1986 (1986-10-28) column 3, line 22 - column 4, line 2 figures 3-5	1,5,11

X	US 2002/144978 A1 (LEONE DAVID A [US] ET AL) 10 October 2002 (2002-10-10) paragraphs [0024] - [0027] figures 1-4	1,5,11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/065418

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