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(54) **Molded case circuit breaker comprising processing unit with data visualization means**

Formgehäuse-Schutzschalter mit Verarbeitungseinheit mit Datenvisualisierungsfunktion

Disjoncteur de boîtier moulé comportant une unité de traitement avec supports de visualisation de données

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(56) References cited:
GB-A- 2 226 464 **US-A- 4 870 531**

- **"SACE Isomax S" INTERNET CITATION 30 April 2007 (2007-04-30), pages 1-28, XP002493894 Retrieved from the Internet: URL:http: //www.sacesales.com/pdf/ITSCE-604 030012.pdf> [retrieved on 2007-04-30]**

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Description

[0001] The present invention relates to the technical field of electrical circuit breakers and in particular to an electrical molded case circuit breaker provided with a processing unit comprising electronic visualization means.

[0002] Molded case circuit breakers provided with an electronic processing unit comprising data visualization means for displaying operating parameters and/or status information of the circuit breaker and moreover provided with means, such as keys, for selecting data to be shown by means of the visualization means and/or for setting and modifying the operating parameters of the circuit breaker are already known.

[0003] Document US 4 870 531 discloses a device according to the preamble of claim 1.

[0004] The circuit breakers of the known art have a drawback in that the display and perhaps also the keypad are occluded and therefore become invisible when on the front of the circuit breaker a front fitting is placed, such as a motor device which has to cooperate with the actuation lever of the circuit breaker.

[0005] The object of the present invention consists in providing a molded case circuit breaker without the above said drawback when compared to circuit breakers of the known art.

[0006] This object is achieved by means of the molded case circuit breaker according to the first appended claim in its more general form and to the dependent claims in particular embodiments of same.

[0007] The present invention also relates to an assembly according to the appended claim 11.

[0008] The invention will be more clearly understood by means of following detailed description of some of its embodiments, in an illustrative and therefore non limiting way, in connection with the drawing, in which:

- fig. 1 shows an isometric view of a particularly preferred embodiment of a molded case circuit breaker according to the present invention, comprising an electronic processing unit,
- fig. 2 shows the electronic processing unit of the circuit breaker of fig. 1,
- fig. 3 shows an enlarged part of the circuit breaker of fig. 1,
- fig. 4 shows a view from a different angle of the circuit breaker part of fig. 3,
- fig. 5 shows an assembly of parts comprising the circuit breaker of fig. 1 and an optional fitting placed on the front of same circuit breaker, and
- fig. 6 shows a view of the assembly of fig. 5, on which a further front fitting is applied.

[0009] In the figures, same or similar elements are provided with the same reference numerals.

[0010] With reference to fig. 1, a particularly preferred illustrative and non limiting embodiment of an electrical molded case circuit breaker according to the present invention is shown, which is generally indicated by reference numeral 1.

[0011] In the particular embodiment of fig. 1, the circuit breaker 1 is for example a magnetic thermal circuit breaker provided with an integrated differential protection module. A molded case circuit breaker, as opposed to a so called air circuit breaker, has a case body 2 made of insulating material, which holds the internal mechanisms and circuits of the circuit breaker. Today, molded case circuit breakers are generally employed in industrial automation and maintenance and service sectors, for instance for interrupting currents up to 1500 A.

[0012] In the above said example, the circuit breaker 1 is formed, in a non limiting way, by an automatic molded case quadripolar circuit breaker provided with an integrated differential protection module.

[0013] The case body 2 is formed by juxtaposing two parts, in particular a base 3, and a lid 4. The base 3 and the lid 4 are juxtaposed and mutually fixed by fixing means, not shown in the figures, such as rivets, screws or bolts.

[0014] The front face 5 of the case body 2, having a generally square shape, comprises a projecting front portion 6, usually defined as "DIN front", which is provided with an opening 7, through which a rotating lever 8 passes, for operating the circuit breaker 1. Typically, as in the example shown, the projecting front portion 6 is disposed in a generally centered position on the front face 5, and is formed by a horizontal protruding band extending between two opposite edges 13, 14 of the front face 5. In a particularly preferred embodiment, a shell-like cover 12, which from now on will be simply called a shell 12, is removably attached to the projecting front portion 6.

[0015] The shell 12 is preferably made of insulating and substantially transparent material, for example transparent plastic material. More preferably, the shell 12 extends on the whole width of the front projecting portion 6. With reference to fig. 4, one may note that in the example shown a removable attachment of the shell 12 to the circuit breaker 1 is provided, for example by means of an engagement system comprising protruding teeth 30 of the projecting front portion 12 and corresponding openings 31 provided on the edge of shell 12. Similar engagement means, not shown, may be provided on the other edge 35 of shell 12.

[0016] With reference to fig. 1, on the upper side of case body 2, four screw clamps 9, or line terminals 9, are provided for connecting the circuit breaker 1 to the electric mains provided before the circuit breaker. Analogous clamps 10, or load terminals, are provided on the lower side of case body 2, for connecting the circuit breaker 1 to an electric circuit provided after the circuit breaker.

[0017] The rear side of case body 2 is provided with suitable fixing means, not shown, for attaching the circuit breaker 1 to an electric panel. For instance, in a non limiting way, such fixing means allow the fixing of the switch 1 to a DIN rail by means of a mounting device as

the one described in Italian patent application no. RM 2006 A 000145.

[0018] The molded case circuit breaker 1 also comprises a processing unit 15, comprising a microprocessor and/or a microcontroller and electronic visualization means 16, which from now on will be referred to as display 16, for displaying data representing operating parameters and/or status information of molded case circuit breaker 1. Advantageously, the display 16 is disposed on the front projecting portion 6 of circuit breaker 1, in a lateral position with respect to the opening 7 and to the operating lever 8. Preferably, the display 16 is a liquid crystal display which displays information in an alphanumeric way. As shown by fig. 1, the display 16 is substantially horizontally aligned to opening 7 and to operating lever 8.

[0019] In a particularly preferred embodiment, the processing unit 15 and the display 16 are housed in a dedicated housing, reference numeral 17 in fig. 2, which is attached to the front projecting portion 6 of circuit breaker 1, in a lateral position with respect to opening 7 and operating lever 8. Preferably, said dedicated housing 17 is made of insulating material, for example a plastic material.

[0020] As shown in fig. 2, in a particularly preferred embodiment, the processing unit comprises two keys or buttons 18, 19, one of which, for example key 18, allows the selection of operating parameters and/or status information of circuit breaker 1 to be shown on display 16. For example, every time key 18 is pressed, a different parameter is shown on display 16, so that by repeatedly pressing key 18 it is possible to sequentially and individually display the various parameters of circuit breaker 1. On the other hand, key 19 is provided for setting/modifying the operating parameters of molded case circuit breaker 1. For example, the parameters to be displayed and/or modified are adjusting parameters for the differential protection module, such as differential response delays, differential protection limit, etc.

[0021] Preferably, the processing unit 15 moreover comprises a communication port in order to provide a data connection between the processing unit 15 and an external processing unit, such as a personal computer. More preferably, this communication port is formed by an USB port, not shown in fig. 2, since it is covered by a protective plug 21. In a particularly preferred but not limiting embodiment, the data connection to the external processing unit is only provided for reading data regarding operating parameters and/or all status information of circuit breaker 1, but doesn't allow modifying/setting of operating parameters of circuit breaker 1. Alternatively, such modifying/setting is made possible only by input, by means of the remote processing unit, of a suitable password, such as one corresponding to a password stored in the processing unit 15. Moreover, the connection to the external unit may also be provided for providing a historical report or log to the external processing unit, such as maintenance/adjusting interventions by service personnel on circuit breaker 1.

[0022] Optionally, the processing unit 15 may comprise one or more signaling lights 20, for example LED devices.

[0023] In fig. 3 and 4, two different views of an enlarged portion of molded case circuit breaker 1 are shown, where shell 12 is more visible. In a particularly preferred embodiment, the shell 12 is generally counter-shaped with respect to the front projecting portion 6 of circuit breaker 1, and comprises an opening 24 opposed to the opening 7, which functions as a passage for the operating lever 8 and a generally collar-shaped turret 22, which is laterally disposed with respect to opening 24, for receiving and housing the processing unit 15. More preferably, the turret 22 has an upper edge 23, which is bent backwards towards the interior of the turret 22, in order to hold in position a generally plate-shaped protection element 29, which is interposed between the upper edge 23 of turret 22 and the processing unit 15. This protection element 29, formed by substantially transparent material, for example a small plate made of Plexiglas or glass, protects the display 16 leaving it readable to the outside.

[0024] In a particularly advantageous embodiment, the protection element 29 is shaped such as to deny access to setting key 19 of processing unit 15, but to allow access to the communication port, which is not visible in the drawing, since it is covered by plug 21, and to key 18 for selecting the information to be displayed. Preferably, anti-tampering signaling means may be provided, in order to tie the protection element 29 to turret 22. For example, the protection element 29 may be provided with a hole 25 associated to a corresponding lateral hole in turret 22, not shown, in order to tie the protection element 29 to turret 22 by means of a seal, for example formed by a ring of metallic wire, closed by a lead seal.

[0025] In a particularly preferred embodiment, the molded case circuit breaker 1 further comprises a test key 26, in order to test the insulation of the system, and a trimmer 27, in order to adjust the thermal set point of circuit breaker 1. As shown in fig. 3, a suitable opening 28 may be provided in the shell 12, for allowing access to test key 26 and trimmer 27. Through opening 28 it is also possible to tie the trimmer 27 to the circuit breaker 1 by means of anti-tampering signaling means. For instance, it is possible to provide the circuit breaker 1 with one or more protruding blocks 33 at opening 28, provided with a respective hole 34 for receiving a wire seal.

[0026] Fig. 5 shows an assembly of parts including the circuit breaker 1 of fig. 1 and an optional fitting 40 placed on the front face 5 of circuit breaker 1. In the particular example shown, the fitting 40 is formed by a motor device, which interacts with the operating lever 8 of circuit breaker 1. As one can see, due to the particular position of display 16 on the front face 5 of circuit breaker 1, placing a frontal fitting 40 does not impair the visibility of display 16.

[0027] As shown in fig. 5, in a particularly preferred embodiment, the optional frontal fitting 40 has a body

with a central portion 41 to be disposed beside the processing unit 15 and two protruding parallel portions 42, 43, projecting from the central portion 41 in order to form a recess 44 extending substantially perpendicularly to the front face 5 and at least partially housing the processing unit 15.

[0028] As shown in fig. 6, it is also possible to provide a covering fitting 45, removably applicable to frontal fitting 40, in order to form a internal channel positioned at the recess 44 and substantially perpendicular to front face 5. This internal channel comprises an end portion to receive the processing unit 15 and is closed at an opposite end portion by a transparent window 46, for example of transparent plastic material, in order to make the display 15 visible through said channel. In this embodiment, the display 15 is preferably a back-lit display.

[0029] It is possible to provide the covering fitting 45 with deflection bars 47, 48, cooperating with the data visualization selection key 18 and the test key 26, in order to permit actuation of such keys 18, 26, even when the front fitting 40 and the covering fitting 45 are set in place.

[0030] In an alternative embodiment, the covering fitting 45 and the front fitting 40 may be formed by a single element to be applied on the front face of circuit breaker 1, but only if a closed channel is provided, which runs through the body of such element, in a position corresponding to the display 15, which extends substantially at right angles to the front face 5 and which is provided with a transparent window 46. The embodiment though in which two distinct parts 40, 45 are provided is preferred, since in this case only one type of front fitting 40 has to be provided, which is:

- coupled to a simple small lid corresponding to recess 44, for closing this recess 44, and may be fixed to the front of a traditional circuit breaker having no display 15;
- coupled to a covering fitting 44 of the type shown in fig. 6, and may be fixed to the front of circuit breaker 1, provided with a display 15, according to the preceding description.

[0031] As becomes clear from the preceding description, a circuit breaker according to the present invention can overcome above said drawback with respect to circuit breakers of the known art. In fact, in a circuit breaker according to the present invention, the display 16 is always visible, and does not hinder the provision of a frontal fitting on a circuit breaker.

[0032] Obviously, a skilled in the art, in order to comply with contingent and specific needs, may introduce various modifications and changes to above said circuit breaker, as defined in the following claims.

Claims

1. Molded case circuit breaker (1) comprising:

- an operating lever (8);
- a case body (2) having a front face (5) provided with a DIN front portion (6) projecting from said face (5), the projecting DIN front portion (6) being provided with an opening (7) as a passage for the operating lever (8);
- a processing unit (15) comprising electronic visualization means (16) comprising a liquid crystal display for displaying data representing operating parameters and/or status information of circuit breaker (1),

characterized in that

the electronic visualization means (1) are disposed on said projecting DIN front portion (6), in a lateral position with respect to said opening (7) and said operating lever (8), said circuit breaker being adapted to be used with a front fitting adapted to cooperate with said operating lever (8) and to be coupled to such front face in such a way that said visualization means (16) are visible.

2. Molded case circuit breaker (1) according to claim 1, wherein the projecting front portion (6) is formed by a band extending between two opposite edges (13, 14) of said front face (5).

3. Molded case circuit breaker (1) according to any of the preceding claims, wherein said lever is a rotating lever.

4. Molded case circuit breaker (1) according to any of the preceding claims, wherein the electronic processing unit (15) and the visualization means (16) are housed in a dedicated housing (17), which is disposed in a lateral position with respect to said opening (7) and operating lever (8).

5. Molded case circuit breaker (1) according to any of the preceding claims, wherein said processing unit (5) comprises at least two keys (18, 19), one of which is provided for selecting data to be displayed and the other for setting/modifying operating parameters of the circuit breaker (1).

6. Molded case circuit breaker (1) according to claim 4, further comprising a shell-like cover (12), which is disposed on said projecting portion (6), provided with a turret (22), which is placed in a lateral position with respect to said opening (7) and said operating lever (8), wherein the turret (22) is arranged in order to internally receive the housing (17) of the processing unit (15).

7. Molded case circuit breaker (1) according to claim 6, wherein said turret (22) has an upper edge (23), which is bent towards the inside of the turret (22), in order to hold in position a generally plate-like pro-

tection element (29), which is interposed between the upper edge (23) of turret and the housing (17) for the processing unit (15).

8. Molded case circuit breaker (1) according to claims 7 and 5, wherein the protection element (29) is shaped so as to deny access to the setting key (19) of the processing unit (15).

9. Molded case circuit breaker (1) according to claim 8, further comprising anti-tampering signaling means, for tying said protection element (29) to the turret (22).

10. Molded case circuit breaker (1) according to any of the preceding claims, wherein the circuit breaker (1) is a magnetic thermal circuit breaker provided with a differential protection module.

11. Assembly of parts (1, 40) comprising a circuit breaker according to any of the preceding claims and said front fitting (40), the latter being adapted to be removably fixed to said front face (5) in order to cooperate with said operating lever (8), said front fitting (40) comprising a body, which is shaped so that said visualization means (16) are visible.

12. Assembly (1, 40) according to claim 11, wherein said body of the front fitting (40) comprises an internal channel, which extends substantially at right angles with respect to said front face (5) and is provided with a first end for receiving the processing unit (15) and an opposite end portion provided with a transparent window (46), so that said visualization means (16) are visible through said channel.

13. Assembly (1, 40) according to claim 11, wherein said body of the front fitting (40) comprises a central portion (41) to be disposed beside the processing unit (15) and two mutually parallel protruding portions (42, 43) projecting from the central portion (41) in order to form a recess (44) extending substantially at right angles with respect to said front face (5) and at least partially housing the processing unit (15).

14. Assembly (1, 40, 45) according to claim 13, further comprising a covering fitting (45), removably attachable to said front fitting (40), in order to form at the recess (44) an internal channel, extending substantially at right angles with respect to said front face (5).

Patentansprüche

1. Ein Formgehäuse-Schutzschalter (1), aufweisend:

- Einen Betätigungshebel (8);
- einen Gehäusekörper (2), der eine Stirnseite (5) aufweist, die mit einem DIN Stirnteil (6) bereitgestellt wird, die von der Seite (5) hervorsteht, wobei das hervorstehende DIN Stirnteil (6) mit einer Öffnung (7) als einen Durchgang für den Betätigungshebel (8) bereitgestellt wird;
- eine Verarbeitungseinheit (15) aufweisend elektrische Visualisierungsmittel (16), aufweisend eine Flüssigkristallanzeige für das Anzeigen von Daten, die die Betriebsparameter und/oder Statusinformationen des Schutzschalter (1) anzeigen;

gekennzeichnet dadurch, dass die elektrischen Visualisierungsmittel (1) an dem hervorstehenden DIN Stirnteil (6) in einer lateralen Position bezüglich der Öffnung (7) und bezüglich des Betätigungshebels (8) angebracht sind, wobei der Schutzschalter angepasst ist, um mit einem vorderen Anschlussstück benutzt zu werden, das angepasst ist mit dem Betätigungshebel (8) zusammenzuwirken und zu jener Stirnseite in solch einer Weise gekoppelt werden soll, dass die Visualisierungsmittel (16) sichtbar sind.

2. Formgehäuse-Schutzschalter (1) gemäß Anspruch 1, wobei das hervorstehende Stirnteil (6) durch ein Band geformt wird, das sich zwischen zwei entgegengesetzten Kanten (13) und (14) der Stirnseite (5) erstreckt.

3. Formgehäuse-Schutzschalter (1) gemäß irgendeinem der vorhergehenden Ansprüche, wobei der Hebel ein rotierender Hebel ist.

4. Formgehäuse-Schutzschalter (1) gemäß irgendeinem der vorhergehenden Ansprüche, wobei die elektronische Verarbeitungseinheit (15) und das Visualisierungsmittel (16) in einem zugehörigen Gehäuse (17) angebracht sind, das in einer lateralen Position bezüglich der Öffnung (7) und des Betätigungshebels (8) angebracht ist.

5. Formgehäuse-Schutzschalter (1) gemäß irgendeinem der vorhergehenden Ansprüche, wobei die Verarbeitungseinheit (5) zumindest zwei Tasten (18, 19) aufweist, von denen eine für das Auswählen von Daten, die angezeigt werden sollen, und die andere für das Setzen/Modifizieren von Betriebsparameter des Schutzschalters (1) bereitgestellt wird.

6. Formgehäuse-Schutzschalter (1) gemäß Anspruch 4, weiterhin aufweisend eine muschelähnliche Abdeckung (12), die auf dem hervorstehenden Anteil (6) angebracht ist und mit einem Dachaufbau (22) bereitgestellt wird, der in einer lateralen Position bezüglich der Öffnung (7) und des Betätigungshebels (8) angebracht ist, wobei der Dachaufbau (22) angeordnet ist, um innendrin das Gehäuse (17) der

Verarbeitungseinheit (15) in Eingriff zu nehmen.

7. Formgehäuse-Schutzschalter (1) gemäß Anspruch 6, wobei der Dachaufbau (22) eine obere Kante (23) aufweist, die gegen die Innenseite des Dachaufbaus (22) gekrümmt ist, um ein allgemein plattenähnliches Schutzelement (29) in einer Position zu erhalten, das zwischen der oberen Kante (23) des Dachaufbaus und dem Gehäuse (17) für die Verarbeitungseinheit (15) angebracht ist.

8. Formgehäuse-Schutzschalter (1) gemäß Ansprüchen 7 und 5, wobei das Schutzelement (29) derart geformt ist, um den Zugang zu den Arretierungsknöpfen (19) der Verarbeitungseinheit (15) zu verhindern.

9. Formgehäuse-Schutzschalter (1) gemäß Anspruch 8, weiterhin aufweisend ein Antiverfälschungssignalmittel für das Befestigen des Schutzelements (29) an dem Dachaufbau (22).

10. Formgehäuse-Schutzschalter (1) gemäß irgendeinem der vorhergehenden Ansprüche, wobei der Schutzschalter (1) ein magnetisch-thermischer Abschalter ist, der mit einem Differentialschutzmodul ausgestattet ist.

11. Zusammenbau von Teilen (1, 40), aufweisend einen Schutzschalter gemäß irgendeinem der vorhergehenden Ansprüche und dem vorderen Anschlussstück (40), wobei Letzteres angepasst ist, um herausnehmbar an der Stirnseite (5) befestigt zu werden, um mit dem Betätigungshebel (8) zusammenzuwirken, wobei das vordere Anschlussstück (40) einen Körper aufweist, der derart geformt wird, dass die Visualisierungsmittel (16) sichtbar sind.

12. Anordnung (1, 40) gemäß Anspruch 11, wobei der Körper des vorderen Anschlussstücks (40) einen inneren Kanal aufweist, der sich im Wesentlichen in einem rechten Winkel bezüglich der Stirnseite (5) erstreckt und mit einem ersten Ende für das Empfangen der Verarbeitungseinheit (15) und einem entgegengesetzten Endanteil, der mit einem transparenten Fenster (46) versehen ist, sodass die Visualisierungsmittel (16) durch den Kanal sichtbar sind.

13. Anordnung (1, 40) gemäß Anspruch 11, wobei der Körper des vorderen Anschlussstücks (40) einen zentralen Abschnitt (41) aufweist, der neben der Verarbeitungseinheit (15) und zwei wechselseitig parallel vorspringenden Anteilen (42, 43) angebracht werden soll, die von dem zentralen Abschnitt (41) hervorstehen, um eine Aussparung (44) zu bilden, die sich im Wesentlichen in einem rechten Winkel bezüglich der Stirnseite (5) und bezüglich zumindest teilweise dem Gehäuse der Verarbeitungseinheit (15) erstreckt.

14. Anordnung (1, 40, 45) gemäß Anspruch 13, weiterhin aufweisend ein Abdeckanschlussstück (55), das entfernbar an dem vorderen Anschlussstück (40) angebracht ist, um bei der Aussparung (44) einen internen Kanal zu formen, der sich im Wesentlichen in einem rechten Winkel bezüglich der Stirnseite (5) erstreckt.

Revendications

1. Disjoncteur (1) à boîtier moulé comprenant :

- un levier de manoeuvre (8) ;
- un corps de boîtier (2) ayant une face avant (5) dotée d'une partie avant DIN (6) se projetant de ladite face (5), la partie avant DIN (6) en projection étant dotée d'une ouverture (7) faisant office de passage pour le levier de manoeuvre (8) ;
- une unité de traitement (15) comprenant des moyens de visualisation électronique (16) comprenant un écran à cristaux liquides pour afficher des données représentant les paramètres de fonctionnement et/ou des informations d'état du disjoncteur (1),

caractérisé en ce que

les moyens de visualisation électronique (1) sont disposés sur ladite partie avant DIN (6) en projection, dans une position latérale par rapport à ladite ouverture (7) et audit levier de manoeuvre (8), ledit disjoncteur étant adapté pour être utilisé avec une pièce de fixation avant adaptée pour coopérer avec ledit levier de manoeuvre (8) et pour être couplée à une telle face avant de sorte que les moyens de visualisation (16) soient visibles.

2. Disjoncteur (1) à boîtier moulé selon la revendication 1, dans lequel la partie avant (6) en projection est formée par une bande s'étendant entre deux bords opposés (13, 14) de ladite face avant (5).

3. Disjoncteur (1) à boîtier moulé selon l'une des revendications précédentes, dans lequel ledit levier est un levier rotatif.

4. Disjoncteur (1) à boîtier moulé selon l'une des revendications précédentes, dans lequel l'unité de traitement électronique (15) et les moyens de visualisation (16) sont logés dans un boîtier dédié (17), qui est disposé dans une position latérale par rapport à ladite ouverture (7) et audit levier de manoeuvre (8).

5. Disjoncteur (1) à boîtier moulé selon l'une des revendications précédentes, dans lequel ladite unité

de traitement (5) comprend au moins deux clés (18, 19), l'une desquelles est pourvue pour sélectionner des données à afficher et l'autre pour régler/modifier les paramètres de fonctionnement du disjoncteur (1).

6. Disjoncteur (1) à boîtier moulé selon la revendication 4, comprenant en outre un couvercle (12) en forme de coque, qui est disposé sur ladite partie en projection (6) dotée d'une tourelle (22), qui est placée dans une position latérale par rapport à ladite ouverture (7) et audit levier de manoeuvre (8), où la tourelle (22) est agencée afin de recevoir à l'intérieur le boîtier (17) de l'unité de traitement (15).

7. Disjoncteur (1) à boîtier moulé selon la revendication 6, dans lequel ladite tourelle (22) a un bord supérieur (23), qui se plie vers l'intérieur de la tourelle (22), afin de maintenir en position un élément de protection (29) généralement en forme de plaque, qui est interposé entre le bord supérieur (23) de la tourelle et le boîtier (17) pour l'unité de traitement (15).

8. Disjoncteur (1) à boîtier moulé selon les revendications 7 et 5, dans lequel l'élément de protection (29) est façonné de sorte à interdire l'accès à la clé de réglage (19) de l'unité de traitement (15).

9. Disjoncteur (1) à boîtier moulé selon la revendication 8, comprenant en outre un moyen de signalisation anti-altération, pour attacher ledit élément de protection (29) à la tourelle (22).

10. Disjoncteur (1) à boîtier moulé selon l'une des revendications précédentes, dans lequel le disjoncteur (1) est un disjoncteur thermique magnétique doté d'un module de protection différentiel.

11. Assemblage de parties (1, 40) comprenant un disjoncteur selon l'une des revendications précédentes et ladite pièce de fixation avant (40), cette dernière étant adaptée pour être fixée de manière amovible à ladite face avant (5) afin de coopérer avec ledit levier de manoeuvre (8), ladite pièce de fixation avant (40) comprenant un corps, qui est conformé de sorte que lesdits moyens de visualisation (16) soient visibles.

12. Assemblage (1, 40) selon la revendication 11, dans lequel ledit corps de la pièce de fixation avant (40) comprend un canal interne, qui s'étend essentiellement à angles droits par rapport à ladite face avant (5) et est doté d'une première extrémité pour recevoir l'unité de traitement (15) et une partie d'extrémité opposée dotée d'une fenêtre transparente (46), de sorte que lesdits moyens de visualisation (16) soient visibles à travers ledit canal.

13. Assemblage (1, 40) selon la revendication 11, dans lequel ledit corps de la pièce de fixation avant (40) comprend une partie centrale (41) à disposer à côté de l'unité de traitement (15) et deux parties protubérantes (42, 43) mutuellement parallèles se projetant de la partie centrale (41) afin de former une cavité (44) s'étendant essentiellement à angles droits par rapport à ladite face avant (5) et recevant au moins partiellement l'unité de traitement (15).

14. Assemblage (1, 40, 45) selon la revendication 13, comprenant en outre une pièce de fixation de couverture (45), pouvant être fixée de manière amovible à ladite pièce de fixation avant (40), afin de former au niveau de la cavité (44) un canal interne, s'étendant essentiellement à angles droits par rapport à ladite face avant (5).

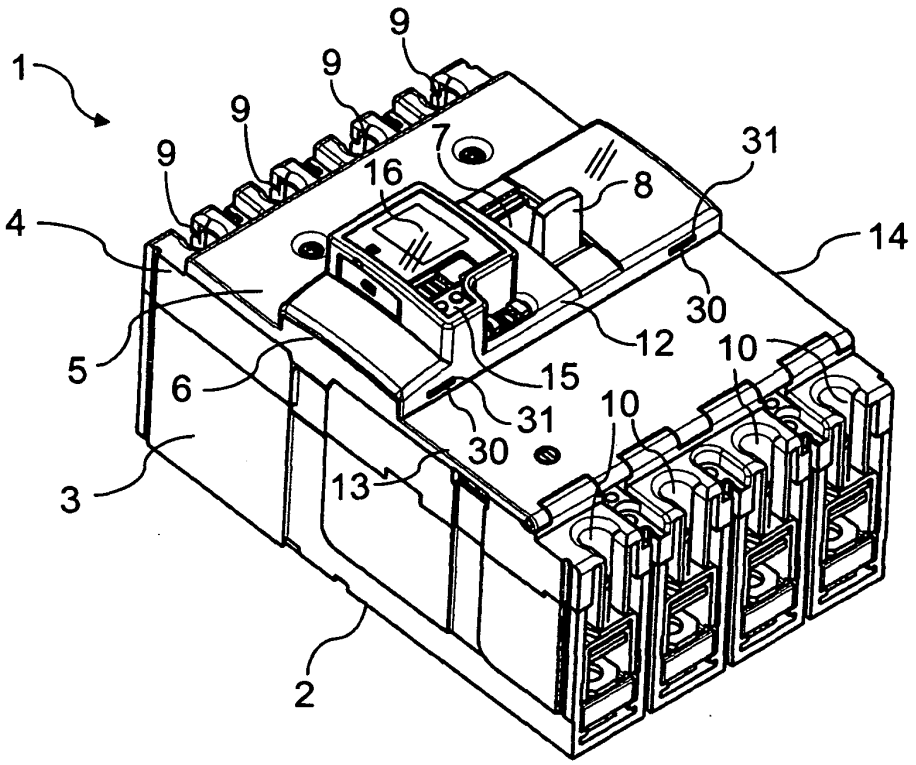
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Fig. 1

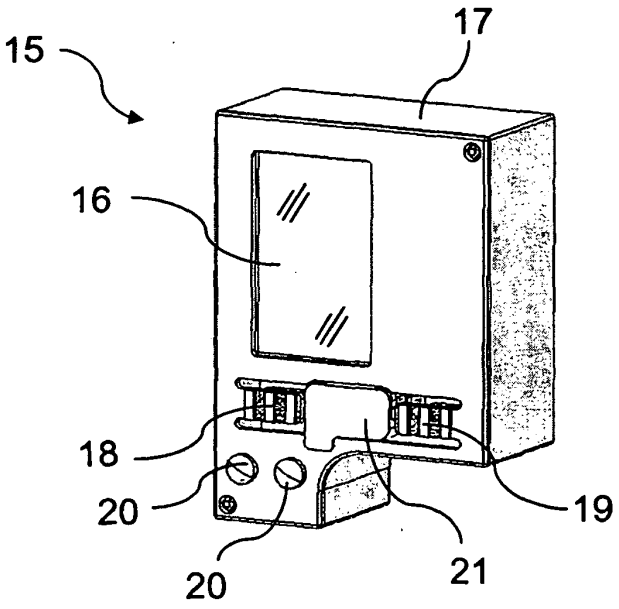
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Fig. 2

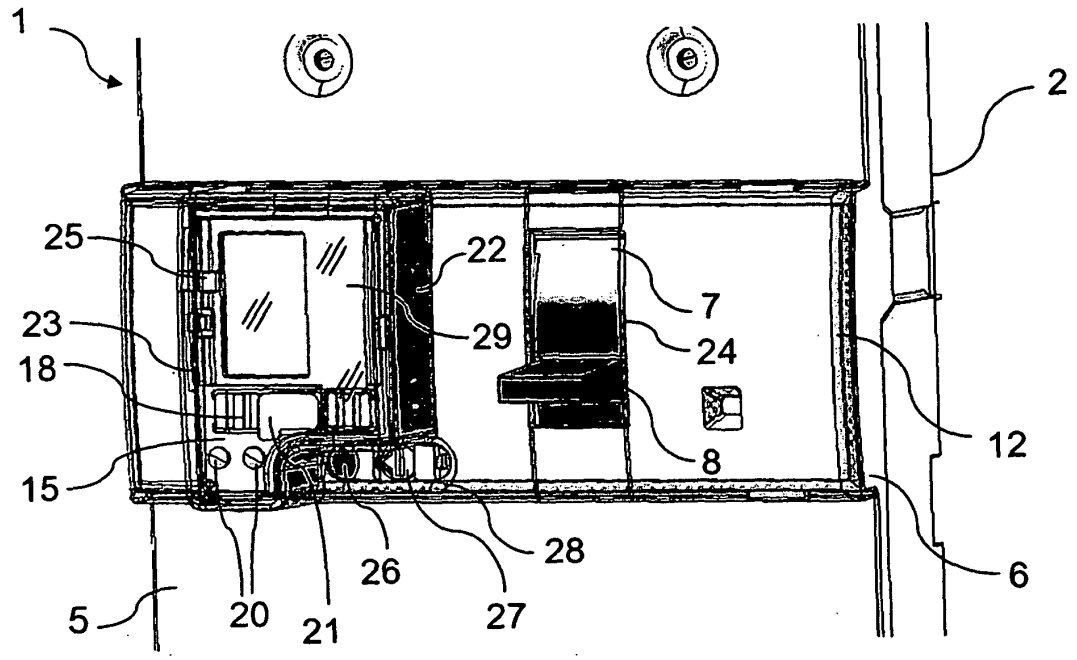
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Fig. 3

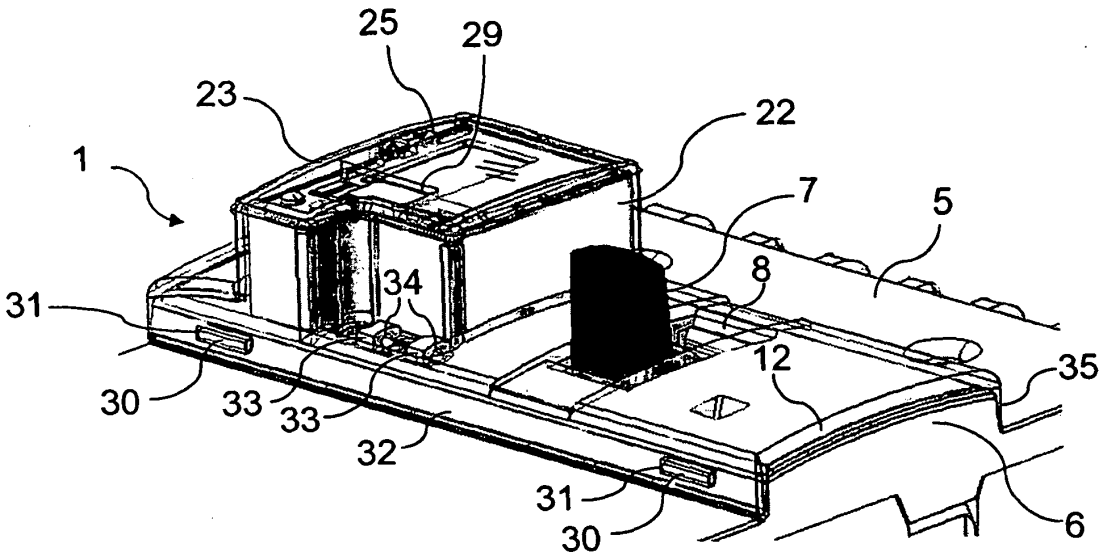
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Fig. 4

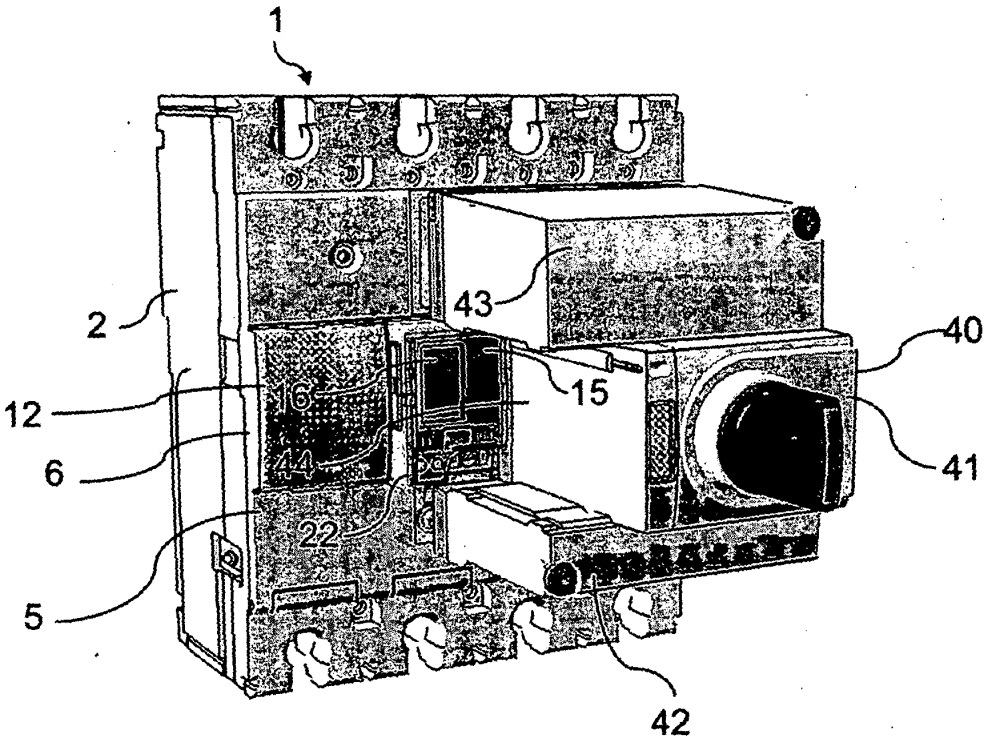

Fig. 5

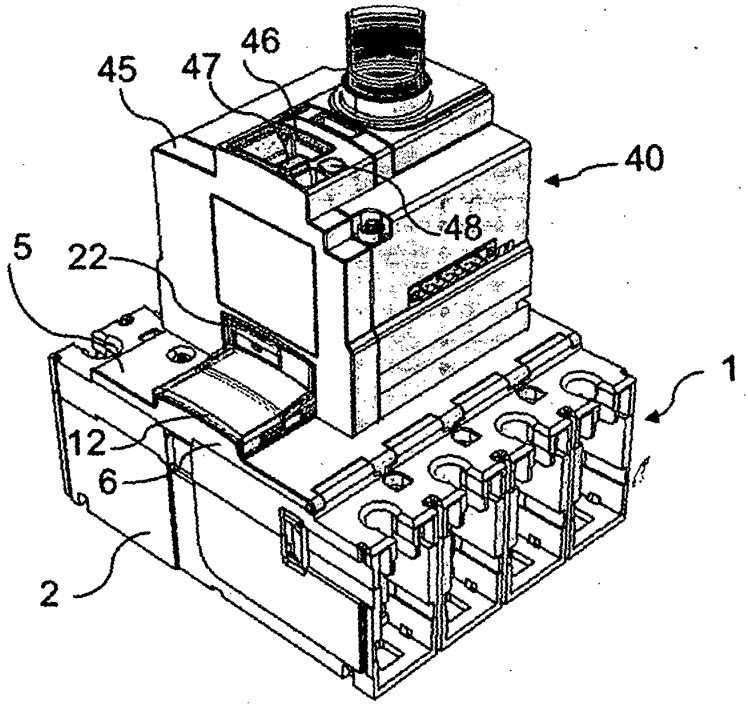

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 4870531 A **[0004]**
- IT RM20060145 A **[0018]**