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(54) **CIRCUIT BREAKER MOVABLE ACTUATOR BLOCKING AND SECURING MEANS**

SPERR- UND SICHERUNGSMITTEL FÜR BEWEGLICHE SCHALTERBETÄTIGUNG

SYSTEME DE FIXATION ET DISPOSITIF DE BLOCAGE POUR ACTIONNEUR MOBILE DE
DISJONCTEUR

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(56) References cited:
US-A- 3 291 924 **US-A- 3 312 794**
US-A- 4 260 861

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Description

BACKGROUND OF THE INVENTION

Field Of The Invention

[0001] The inventions described in this application relate to an apparatus, means, system and method for blocking and locking or otherwise securing, without the use of tools, tamper-resistant screws or other fasteners, a circuit breaker movable actuator, such as an operating or toggle handle, so as to better prevent the intentional or unintentional substantial displacement or movement of the circuit breaker movable actuator at least between its at least two positions, such as its ON or OFF positions, so as to prevent the circuit breaker from being switched at least between its at least two operating states, such as its ON and OFF states. The circuit breaker movable actuator blocking and securing apparatus or means may use at least up to four padlocks or any other suitably appropriate locking or securing apparatus or device.

[0002] Thus, the inventions are believed to provide a relatively elegant, cost effective and reliable apparatus, means, system and method for blocking and locking or otherwise securing, without the use of tools, tamper-resistant screws or other fasteners, a circuit breaker movable actuator so as to better prevent the intentional or unintentional substantial displacement or movement of the circuit breaker movable actuator at least between its at least two positions, such as its ON or OFF positions.

Background

[0003] In certain industrial applications, circuit breakers may be locked in the OFF position to allow for electrical or mechanical repairs so as to better prevent the circuit breaker being set from its OFF state to its ON state. Electric utility companies may lock circuit breakers in the OFF state to prevent the unauthorized use of power.

[0004] One known device includes that shown in U.S. Patent No. 4,260,861, which is entitled "Handle Locking Means For Circuit Breaker" ("the '861 patent"). This device may be described as using a "scissor" type locking arrangement. When the circuit breaker operating or toggle handle locking device is attached to a circuit breaker, its removal is generally prevented by two tamper resistant screws 81 and 82 as shown in Figure 2 of the '861 patent. The circuit breaker operating or toggle handle may be locked by sliding a blocking member 50 between side members of frame members 10 and 30, all of which are components of the handle locking device of the '861 patent, until holes 63 and 64 are aligned respectively with holes 23, 43 and 24, 44. To prevent the circuit breaker operating or toggle handle from being moved from its OFF position to its ON position, a padlock bail 80 may then be inserted as follows: through holes 23, 43

and 63; through holes 24, 44 and 64; or if the padlock bail is sufficiently long, through holes 23, 43, 63, 24, 44 and 64. To prevent the circuit breaker operating or toggle handle being moved from its ON position to its OFF position, however, pilot holes 83 and 84 must be enlarged, such as by drilling, to the diameter of holes 85 and 86 so that a padlock bail 80 may be inserted therethrough.

[0005] Some potential limitations of the above approach are as follows. The above approach may not allow for the use of circuit breaker operating or toggle handle extensions required to install and remove the handle locking device referred to above. Further, to padlock the circuit breaker operating or toggle handle in its ON position, the pilot holes must be enlarged, such as by drilling, so that a padlock bail may be inserted therethrough. Finally, if the padlock bail is not sufficiently large, the circuit breaker operating or toggle handle locking device may not be sufficiently secure.

Summary Of The Invention

[0006] It is an object of the present invention to overcome the limitations or problems of at least certain of the known approaches.

[0007] In accordance with one aspect of the present invention, there is provided locking apparatus for a circuit breaker assembly comprising a circuit breaker and a movable actuator which is movable between at least a first position and a second position to actuate the circuit breaker between at least a first state and a second state respectively, the locking apparatus comprising:- a main frame member; a main frame fastening member for fastening the main frame member to the circuit breaker assembly with respect to the movable actuator, a first sub-frame member; at least one first sub-frame fastening member for fastening the main frame member to the circuit breaker assembly with respect to the movable actuator; and a second sub-frame member movably associated with the main frame member, characterised in that the locking apparatus further comprises a blocking member for substantially blocking movement of the movable actuator at least between its at least first and second positions, and in that said at least one sub-frame fastening member fastens the first sub-frame member to the circuit breaker assembly.

[0008] In accordance with another aspect of the present invention, there is provided a method of securing a circuit breaker assembly with locking apparatus as described above, the circuit breaker assembly comprising a movable actuator which extends through a face plate and has at least two positions, the method comprising the steps of:- moving the main frame fastening member into an aperture located at one end of the movable actuator so as to seat the main frame member adjacent the face plate; moving the first sub-frame member with respect to the main frame member so as to move said at least one first sub-frame fastening member into another aperture located at the other end of the movable

actuator so as to seat the first sub-frame member adjacent the main frame member and the face plate; and moving the second sub-frame member with respect to the main frame member to position the blocking member so as to block substantial movement of the movable actuator.

[0009] In one embodiment, a circuit breaker movable actuator locking apparatus for use with a circuit breaker assembly is provided, where the circuit breaker assembly has a movable actuator that is movable at least between at least a first position and a second position for actuating the circuit breaker to at least a first state and a second state, the circuit breaker movable actuator locking apparatus comprising: a main frame member, wherein the main frame member comprises a main frame fastening member that is adapted to fasten the main frame member with respect to the movable actuator; a first sub-frame member, wherein the first sub-frame member is adapted to be movably associated with the main frame member, and wherein the first sub-frame member comprises at least one first sub-frame fastening member that is adapted to fasten the main frame member with respect to the movable actuator; a second sub-frame member, wherein the second sub-frame member is adapted to be movably associated with the main frame member, and wherein the second sub-frame member has a blocking member that is adapted to block substantial movement of the movable actuator at least between its at least first and second positions.

[0010] In a second embodiment, a circuit breaker movable actuator locking mean for use with a circuit breaker assembly is provided, where the circuit breaker assembly has a movable actuator that is movable at least between at least a first position and a second position for actuating the circuit breaker to at least first state and a second state, the circuit breaker movable actuator locking means comprising: a main frame member means for attachment to the circuit breaker assembly, wherein the main frame member means comprises at least one main frame fastening member for fastening the main frame member means with respect to the movable actuator; a first sub-frame member means for being movably associated with the main frame member means, wherein the first sub-frame member means comprises at least one first sub-frame fastening member that is adapted to fasten the main frame member with respect to the movable actuator; a second sub-frame member means for being movably associated with the main frame member means, wherein the second sub-frame member means has a blocking member means for blocking substantial movement of the movable actuator at least between its at least first and second positions.

[0011] In a further embodiment, a circuit breaker movable actuator locking system comprising: a circuit breaker assembly is provided, where the circuit breaker assembly has a movable actuator that is movable at least between at least a first position and a second position

for actuating the circuit breaker to at least a first state and a second state; a main frame member, wherein the main frame member comprises a main frame fastening member that is adapted to fasten the main frame member with respect to the circuit breaker assembly; a first sub-frame member, wherein the first sub-frame member is adapted to be movably associated with the main frame member, and wherein the first sub-frame member comprises at least one first sub-frame fastening member that is adapted to fasten the main frame member with respect to the circuit breaker assembly; a second sub-frame member, wherein the second sub-frame member is adapted to be movably associate with the main frame member, and wherein the second sub-frame member has a blocking member that is adapted to block substantial movement of the movable actuator at least between its at least first and second positions.

[0012] In still another embodiment, a circuit breaker movable actuator locking system means comprising: a circuit breaker means, where the circuit breaker assembly means has a movable actuator means that is movable at least between at least a first position and a second position for actuating the circuit breaker means to at least a first state and a second state; a main frame member means for attachment to the circuit breaker means, wherein the main frame member means comprises at least one main frame fastening member for fastening the main frame member means with respect to the circuit breaker means; a first sub-frame member means for being movably associated with the main frame member means, wherein the first sub-frame member means comprises at least one first sub-frame fastening member that is adapted to fasten the main frame member with respect to the circuit breaker means; a second sub-frame member means for being movably associated with the main frame member means, wherein the second sub-frame member means has a blocking member means for blocking substantial movement of the movable actuator means at least between its at least first and second positions.

[0013] A method for securing a circuit breaker having a movable actuator is also provided, which extends through a circuit breaker face plate and which may at least be moved between its at least two positions, which comprises the steps of: moving a fastening portion of a main frame member of a circuit breaker movable actuator locking apparatus into an aperture located at one end of the movable actuator so as to seat the main frame member adjacent to the circuit breaker face plate; moving a first sub-frame member with respect to the main frame member so as to move a fastening portion of the first sub-frame member into another aperture located at another end of the movable actuator so as to seat the first sub-frame adjacent to the main frame member and the circuit breaker face plate; and moving a second sub-frame member with respect to the main frame member to position blocking portion of the second sub-frame member so as to block substantial movement of the

movable actuator.

[0014] The above method includes the further step of inserting at least a segment of at least one securing device through at least one securing aperture of the main frame member, the first sub-frame member and the second sub-frame member to block securely substantial movement of the movable actuator.

[0015] A method for securing a circuit breaker having a movable actuator means for at least moving between at least two positions is provided, in which the movable actuator means extends through a circuit breaker face plate means for covering at least a portion of a circuit breaker, which comprises the steps of: moving a fastening portion of a main frame member means, which is for seating adjacent to the circuit breaker face plate means, into an aperture located at one end of the movable actuator means so as to seat the main frame member means adjacent to the circuit breaker face plate means; moving a first sub-frame member means, which is for seating adjacent to at least the main frame member means, with respect to the main frame member means so as to move a fastening portion of the first sub-frame member means into another aperture located at another end of the movable actuator means so as to seat the first sub-frame means adjacent to the main frame member means and the circuit breaker face plate means; and moving a second sub-frame member means having a blocking portion, which is for seating adjacent to at least the main frame member means with respect to the main frame member means so as to position the blocking portion of the second sub-frame member means so as to block substantial movement of the movable actuator means.

[0016] The above method includes the further step of inserting at least a segment of a securing device means, which is for securely blocking substantial movement of the movable actuator means, through at least one securing aperture of the main frame member means, the first sub-frame member means and the second sub-frame member means, to block securely substantial movement of the movable actuator means.

[0017] These and other objects, advantages and features of the present invention will be readily understood and appreciated with reference to the detailed description of preferred embodiments discussed below together with the accompanying drawings.

Brief Description Of The Drawings

[0018]

Figure 1 is a drawing of one embodiment of the components of the circuit breaker movable actuator blocking and securing apparatus and means of the present inventions.

Figure 2 is a drawing of the apparatus, means and system of the present inventions, in which the circuit

breaker movable actuator blocking and securing apparatus and means is in its unblocked or open condition.

Figure 3A is a drawing of the apparatus, means, system and method of the present inventions, in which the circuit breaker movable actuator blocking and securing apparatus and means is in its blocked or closed condition.

Figure 3B is a drawing of the apparatus, means, system and method of the present inventions, in which a padlock securing device is used to place the circuit breaker movable actuator blocking and securing apparatus and means in its securely blocked or closed condition.

Figure 4 is a cross-sectional view of the apparatus, means and system of the present inventions to show how the circuit breaker movable actuator blocking and securing apparatus and means is fastened to the movable actuator area of the circuit breaker assembly.

Detailed Description Of Preferred Embodiment

[0019] Referring to Figures 1 to 4, the circuit breaker movable actuator blocking and securing system 1 comprises a circuit breaker movable actuator blocking and securing apparatus, assembly or device 20 and a circuit breaker assembly 62. The circuit breaker movable actuator blocking and securing apparatus, assembly or device 20 comprises a main frame member 21, a first sub-frame member 37 and a second sub-frame member 49. Four shoulder rivets 51a, 51b, 52a and 52b, or any other suitably appropriate movable, pivotable or rotatable fastening device, are used to assemble together the main frame member 21, the first sub-frame member 37 and the second sub-frame member 49, each of which may be formed or stamped from a single piece of material. The main frame member 21, the first sub-frame member 37 and the second sub-frame member 49 are preferably made from steel, but may also be made from any other material suitably appropriate for use in securing a circuit breaker.

[0020] In particular, the main frame member 21 comprises upper horizontal main frame member 27a and lower horizontal main frame member 27b, and left vertical main frame member 28a and right vertical main frame member 28b. The main frame member 21 also comprises left flange main frame member 29a and right flange main frame member 29b, each of which are integrally associated with or otherwise associated in a suitably appropriate way with respect to main frame members 27a, 27b and 28a, 28b. As shown in Figure 1, for example, the main frame flange members 29a and 29b are formed generally perpendicularly to vertical main frame members 28a and 28b, respectively. Upper hori-

zontal main frame member 27a further comprises an upper fastening or mounting tab member or portion 22, which is integrally associated with or otherwise associated in a suitably appropriate way with respect to the lower inside edge of left vertical main frame member 27a, and which extends generally in a direction opposite to or downwardly with respect to the outwardly projecting main frame flange members 29a and 29b. Main frame flange members 29a and 29b comprise lower fastening apertures, holes or openings 30a and 30b, respectively, which are used to movably, pivotably or rotatably fasten first sub-frame member 37. Main frame flange members 29a and 29b also comprise upper fastening apertures, holes or openings 25a and 25b, respectively, which are used to movably, pivotably or rotatably fasten second sub-frame member 49. Main frame flange members 29a and 29b further comprise first sub-frame tab fastening slotted apertures or openings 24a and 24b, respectively, which are adapted to receive first sub-frame fastening tab members or portions 44a and 44b, respectively. In particular, first sub-frame tab fastening slotted apertures or openings 24a and 24b receive first sub-frame fastening tab flange members or portions 45a and 45b, respectively.

[0021] Finally, main frame flange member 29a of main frame member 21 comprises up to at least two padlock bail or other securing device receiving apertures, holes or openings 26a, and main frame flange member 29b of main frame member 21 similarly comprises up to at least two padlock bail or other securing device receiving apertures, holes or openings 26b. The padlock bail or other securing device receiving apertures, holes or openings 26a and 26b are adapted to receive at least up to four padlock bails 71 of at least up to four padlocks 70 or at least a segment of at least another securing device.

[0022] The first sub-frame member 37 comprises first sub-frame lower member 40, and first sub-frame left flange member 39a and first sub-frame right flange member 39b, which are integrally associated with or otherwise associated in a suitably appropriate way with respect to first sub-frame lower member 40. As shown in Figure 1, for example, the first sub-frame flange members 39a and 39b are formed generally perpendicularly to the first sub-frame lower member 40. First sub-frame member 37 further comprises a first sub-frame fastening or mounting tab member or portion 41, which is integrally associated with or otherwise associated in a suitably appropriate way with respect to the inside edge of first sub-frame lower member 40, and which extends generally in a direction opposite to or downwardly with respect to the outwardly projecting first sub-frame flange members 39a and 39b. First sub-frame flange members 39a and 39b comprise first sub-frame fastening apertures, holes or openings 43a and 43b, respectively, which are aligned with main frame fastening apertures, holes or openings 30a and 30b, respectively, when the circuit breaker movable actuator blocking and securing apparatus components 21 and 37 are assembled together.

First sub-frame flange members 39a and 39b also comprise first sub-frame fastening tabs 44a and 44b, respectively. As discussed, the first sub-frame fastening tabs 44a and 44b have first sub-frame fastening tab flange members or portions 45a and 45b, respectively, which are inserted into first sub-frame fastening tab apertures, holes or openings 24a and 24b so as to fasten the first sub-frame member 37 with respect to main frame member 21. Finally, first sub-frame flange member 39a comprises up to at least two first sub-frame padlock bail or other securing device receiving apertures, holes or openings 46a, and first sub-frame flange member 39b similarly comprises up to at least two first sub-frame padlock bail or other securing device receiving apertures, holes or openings 46b. The first sub-frame padlock bail or other securing device receiving apertures, holes or openings 46a and 46b, which are aligned with main frame padlock bail or other securing device receiving apertures, holes or openings 26a and 26b, respectively, are adapted to receive at least up to four padlock bails 71 of at least up to four padlocks 70 or at least a segment of at least another securing device.

[0023] The second sub-frame member 49 comprises second sub-frame lower member 50, second sub-frame left flange member 52a and second sub-frame right flange member 52b. Second sub-frame flange members 52a and 52b are integrally associated with or otherwise associated in a suitably appropriate way with respect to second sub-frame lower member 50. As shown in Figure 1, for example, the second sub-frame flange members 52a and 52b are formed generally perpendicularly to the second sub-frame lower member 50. Second sub-frame member 49 further comprises a second sub-frame blocking tab member or portion 51, which is integrally associated with or otherwise associated in a suitably appropriate way with respect to the inside edge of second sub-frame lower member 50, and which generally extends inwardly along the same plane as second sub-frame lower member 50. Second sub-frame flange members 52a and 52b comprise second sub-frame fastening flange members 53a and 53b, respectively, which further comprise second sub-frame fastening apertures, holes or openings 54a and 54b, respectively, which are aligned with upper main frame fastening apertures, holes or openings 25a and 25b, respectively, when the circuit breaker movable actuator blocking and securing apparatus components 21 and 49 are assembled together. Finally, second sub-frame flange member 52a comprises up to at least two first sub-frame padlock bail or other securing device receiving apertures, holes or openings 56a, and second sub-frame flange member 52b similarly comprises up to at least two first sub-frame padlock bail or other securing device receiving apertures, holes or openings 56b. The second sub-frame padlock bail or other securing device receiving apertures, holes or openings 56a and 56b, which are aligned with main frame padlock bail or other securing device receiving apertures, holes or openings 26a and 26b and

which are also aligned with first sub-frame padlock bail or other securing device receiving apertures, holes or openings 46a and 46b, are adapted to receive at least up to four padlock bails 71 of at least up to four padlocks 70 or at least a segment of at least another securing device, such as a securing cable with lock.

[0024] In the circuit breaker operator or toggle handle padlock system 1, the circuit breaker assembly 62, which receives the circuit breaker operating handle assembly 20, comprises an operating or toggle handle or movable actuator 64, which may have at least an ON position, a TRIPPED position and an OFF position. The circuit breaker assembly 62 further comprises a corresponding upper operating or toggle handle or movable actuator aperture or slot 65, which is located in a circuit breaker face plate or escutcheon 63 of the circuit breaker assembly 62. Below an upper portion 63a of the circuit breaker face plate or escutcheon 63 defining the operating handle or movable actuator aperture or opening 65, there is an upper fastening slotted area, aperture or opening 65a. Similarly, below a lower portion 63b of the circuit breaker face plate or escutcheon 63 defining the operating handle or movable actuator aperture or opening 65, there is a lower fastening slotted area, aperture or opening 65b. Both the upper and lower fastening slotted areas, apertures or openings 65a and 65b are adapted to receive the main frame upper fastening tab member or portion 22 and the first sub-frame lower fastening tab member or portion 41.

[0025] The circuit breaker assembly 62 may further comprise push-to-trip buttons, circuit breaker lug openings or apertures and circuit breaker mounting openings or apertures (not shown). The circuit breaker assembly 62 may include an electronic trip unit, which may further include energy measurement capabilities. Further, the circuit breaker assembly 62 may be a "single" unit, or in certain arrangements, the circuit breaker assembly 62 may also comprise a separate circuit breaker unit and a corresponding plug-in unit (not shown). In such an arrangement, threaded screws or bolts may be passed through the circuit breaker mounting apertures or openings and are received by threaded apertures or openings in the corresponding plug-in unit so as to mount the circuit breaker unit on the plug-in unit. Also, the circuit breaker lug apertures or openings may be used to receive threaded copper studs, which may be plugged into copper tulip contacts that are provided in the plug-in unit. In this way, a current path may be provided through the plug-in unit to the circuit breaker unit.

[0026] The circuit breaker movable actuator blocking and securing apparatus, assembly, device or means 20 is assembled as follows:

[0027] Grasping or otherwise taking the first sub-frame member 37, it is at least partially positioned or placed within the main frame member 21 so that first sub-frame lower fastening apertures, holes or openings 43a and 43b, which are located in the lower end of the first sub-frame flange members 39a and 39b, respec-

tively, are aligned with main frame lower fastening apertures, holes or openings 30a and 30b, respectively, when the circuit breaker movable actuator blocking and securing apparatus components 21 and 37 are assembled together. Next, shoulder rivets 51a and 51b are inserted through main frame fastening apertures, holes or openings 30a and 30b, respectively, and through first sub-frame fastening apertures, holes or openings 43a and 43b, respectively, which are aligned with main frame fastening apertures, holes or openings 30a and 30b respectively. The inserted end of shoulder rivets 51a and 51b may then be compressed so that they are no longer removable from main frame fastening apertures, holes or openings 30a and 30b, respectively, or from first sub-frame fastening apertures, holes or openings 43a and 43b, respectively. Of course, any other suitably appropriate movable, pivotable or rotatable fastening apparatus may be used rather than the specific configuration discussed above.

[0028] Next, taking the upper end of second sub-frame member 49, it is at least partially positioned or placed within the main frame member 21 so that second sub-frame fastening apertures, holes or openings 54a and 54b, which are located in the upper end of the second sub-frame flange members 53a and 53b, respectively, are aligned with main frame upper fastening apertures, holes or openings 25a and 25b, respectively, when the circuit breaker movable actuator blocking and securing apparatus components 21 and 49 are assembled together. Next, shoulder rivets 52a and 52b are inserted through main frame upper fastening apertures, holes or openings 25a and 25b, respectively, and through second sub-frame fastening apertures, holes or openings 54a and 54b, respectively, which are aligned with main frame upper fastening apertures, holes or openings 25a and 25b, respectively. The inserted end of shoulder rivets 52a and 52b may then be compressed so that they are no longer removable from main frame upper fastening apertures, holes or openings 25a and 25b, respectively, or from the second sub-frame fastening apertures, holes or openings 54a and 54b, respectively. Of course, any other suitably appropriate movable, pivotable or rotatable fastening apparatus may be used rather than the specific configuration discussed above.

[0029] The circuit breaker movable actuator blocking and securing assembly 20 attaches to, is fastened or is otherwise mounted on the circuit breaker assembly 62 in the following way:

[0030] First, the main frame member 21 of the circuit breaker movable actuator blocking and securing assembly 20 is grasped or otherwise taken and at least its upper end is placed or positioned so as to move, place or slide the upper main frame fastening tab flange member or portion 25 of the upper main frame fastening tab member or portion 22 into a corresponding upper operating or toggle handle or movable actuator aperture, opening or slot 65a, which is located under the upper

inner member or portion 63a of circuit breaker face plate or escutcheon 63, which defines the operating handle or movable actuator aperture or opening 65 therein. As this is done, the bottom face of the main frame member 21 is seated firmly with respect to or otherwise adjacent to the front or top face of the circuit breaker face plate or escutcheon 63 so as to surround the operating handle or movable actuator aperture or opening 65.

[0031] If the circuit breaker operating or toggle handle or movable actuator 64 is in its OFF position and must be locked or otherwise secured in its OFF position, the first sub-frame member 37 is then moved, pivoted or rotated about points 30a and 30b so as to move, place or slide the lower first sub-frame fastening tab flange member or portion 42 of the first sub-frame lower fastening tab member or portion 41 into a corresponding lower operating or toggle handle or movable actuator aperture, opening or slot 65b, which is located under the lower inner member or portion of circuit breaker face plate or escutcheon 63, which also defines the operating handle or movable actuator aperture or opening 65 therein. As the upper ends of first sub-frame flange members 39a and 39b are moved, pivoted or rotated so as to be seated firmly with respect to or otherwise adjacent to the top face of main frame vertical arm portions 28a and 28b, respectively, the first sub-frame fastening tab flange member or portions 45a and 45b of first sub-frame fastening tab members or portions 44a and 44b, respectively, snap into or otherwise fit into main frame slotted fastening tab apertures or openings 24a and 24b, respectively, thereby firmly seating the bottom face of the first sub-frame member 37 with respect to or otherwise adjacent to the top face of horizontal and vertical main frame members 27a, 27b and 28a, 28b. Finally, the second sub-frame member 49 is then moved, pivoted or rotated about points 25a and 25b so as to move, place or slide the lower arm member 50 and its blocking tab member or portion 51 on the upper side of the circuit breaker operating or toggle handle or movable actuator 64 so as to block movement of the operating handle or movable actuator 64 from its OFF position to its ON position. In this way, the lower ends of second sub-frame flange members 53a and 53b are also moved, pivoted or rotated so as to be seated firmly with respect to or otherwise adjacent to the top face of main frame vertical arm portions 28a and 28b, respectively.

[0032] Finally, as discussed main frame flange member 29a of main frame member 21 comprises up to at least two padlock bail or other securing device receiving apertures, holes or openings 26a, and flange member 29b of main frame member 21 similarly comprises up to at least two padlock bail or other securing device receiving apertures, holes or openings 26b. First sub-frame flange members 39a and 39b similarly each comprise up to at least two first sub-frame padlock bail or other securing device receiving apertures, holes or openings 46a and 46b, respectively. Second sub-frame flange members 52a and 52b also similarly comprise up to at

least two second sub-frame padlock bail or other securing device receiving apertures, holes or openings 56a and 56b, respectively. When main frame member 21 has been mounted to, fastened to or otherwise with the circuit breaker face plate or escutcheon 63 and first sub-frame member 37 and second sub-frame member 49 have been firmly seated with respect to main frame member 21, the first sub-frame padlock bail or other securing device receiving apertures, holes or openings 46a and 46b will be aligned with main frame padlock bail or other securing device receiving apertures, holes or openings 26a and 26b and also will be aligned with second sub-frame padlock bail or other securing device receiving apertures, holes or openings 56a and 56b, respectively. At least up to four padlock bails 71 of at least up to four padlocks 70 or other securing devices may then be inserted through padlock bail or other securing device receiving apertures, holes or openings 26, 46 and 56, which, as discussed, are adapted to receive at least up to four padlock bails 71 of at least up to four padlocks 70 or at least a segment of at least another securing device. Of course, any other suitably appropriate securing apparatus or device other than padlocks may also be used to secure the circuit breaker operating or toggle handle assembly 20 on the circuit breaker assembly 62 so that the circuit breaker operating or toggle handle or movable actuator 64 may not be moved from its OFF position to its ON position, either intentionally or unintentionally.

[0033] If the circuit breaker operating or toggle handle a movable actuator 64 is in its ON position and must be blocked and locked or otherwise secured in its ON position, the lower blocking tab member or portion 51 must be removed from lower arm portion 50 of the second sub-frame member 49. To facilitate this operation, a break-line 51' at which the lower blocking tab member or portion 51 perpendicularly meets in the same plane the remainder of lower arm portion 50 may be pre-punched, scribed or otherwise weakened so as to preform the weakened break-line 51'. In this way, the lower blocking tab member or portion 51 may be bent either manually without tools or with simple tools, such as pliers, for example, so as to break off or otherwise remove the lower blocking tab member or portion 51. As before, the first sub-frame member 37 may then be moved, pivoted or rotated about points 30a and 30b so as to move, place or slide the lower fastening tab flange member or portion 42 of the first sub-frame lower fastening tab member or portion 41 into a corresponding lower operating or toggle handle or movable actuator aperture, opening or slot 65b, which is located under the lower inner member or portion 63b of circuit breaker face plate or escutcheon 63, which also defines the operating handle or movable actuator aperture or opening 65 therein. As the upper ends of first sub-frame flange members 39a and 39b are moved, pivoted or rotated so as to be seated firmly with respect to or otherwise adjacent to the top face of main frame vertical arm portions 28a and

28b, respectively, the first sub-frame fastening tab flange members or portions 45a and 45b of first sub-frame fastening tab members or portions 44a and 44b, respectively, snap or otherwise fit into main frame slot-
 5 fastened fastening tab apertures or openings 24a and 24b, respectively, thereby firmly seating the bottom face of the first sub-frame member against the top face of horizontal and vertical main frame members 27a, 27b and 28a, 28b. Next, the second sub-frame member 49 is
 10 moved, pivoted or rotated about points 25a and 25b so as to move, place or slide the lower arm member 50 on the lower side of the circuit breaker operating or toggle handle or movable actuator 64 so as to block movement of the operating handle or movable actuator 64 from its
 15 ON position to its OFF position. In this way, the lower ends of second sub-frame flange members 52a and 52b are also moved, pivoted or rotated so as to be seated firmly with respect to or otherwise adjacent to the top face of main frame vertical arm portions 28a and 28b,
 20 respectively.

[0034] Finally, when main frame member 21 has been mounted to, fastened to or otherwise associated with the circuit breaker face plate or escutcheon 63 and first sub-frame member 37 and second sub-frame member 49 have been firmly seated with respect to or otherwise ad-
 25 jacent to main frame member 21, the first sub-frame padlock bail or other securing device receiving apertures, holes or openings 46a and 46b will be aligned with main frame padlock bail or other securing device receiving apertures, holes or openings 26a and 26b and also
 30 will be aligned with second sub-frame padlock bail or other securing device receiving apertures, holes or openings 56a and 56b, respectively. At least up to four padlock bails 71 of at least up to four padlocks 70 or other securing devices may then be inserted through
 35 padlock bail or other securing device receiving apertures, holes or openings 26, 46 and 56, which, as discussed, are adapted to receive at least up to four padlock bails 71 of at least up to four padlocks 70 or at least a segment of at least another securing device. Of
 40 course, any other suitably appropriate securing apparatus or device may also be used to secure the circuit breaker operating or toggle handle assembly 20 on the circuit breaker assembly 62 so that the circuit breaker operating or toggle handle or movable actuator 64 may
 45 not be moved from its ON position to its OFF position, either intentionally or unintentionally.

Claims

1. Locking apparatus (20) for a circuit breaker assembly (62) comprising a circuit breaker and a movable actuator (64) which is movable between at least a first position and a second position to actuate the circuit breaker between at least a first state and a second state respectively, the locking apparatus (20) comprising:-

a main frame member (21);
 a main frame fastening member (22) for fastening the main frame member (21) to the circuit breaker assembly (62) with respect to the movable actuator (64);
 a first sub-frame member (37);
 at least one first sub-frame fastening member (42) for fastening the main frame member (21) to the circuit breaker assembly (62) with respect to the movable actuator (64); and
 a second sub-frame member (49) movably associated with the main frame member (21);

characterised in that the locking apparatus further comprises a blocking member (51) for substantially blocking movement of the movable actuator (64) at least between its at least first and second positions, and **in that** said at least one sub-frame fastening member (42) fastens the first sub-frame member (37) to the circuit breaker assembly (62).

2. Apparatus according to claim 1, wherein the first sub-frame member (37) is movably associated with the main frame member (21).
3. Apparatus according to claim 1 or 2, wherein the second sub-frame member (49) is rotatably mounted with respect to the main frame member (21).
4. Apparatus according to any one of the preceding claims, wherein the first sub-frame member (37) is rotatably mounted with respect to the main frame member (21).
5. Apparatus according to any one of the preceding claims, wherein the main frame member (21), the first sub-frame member (37) and the second sub-frame member (49) are adapted so that they securely block substantial movement of the movable actuator (64).
6. Apparatus according to any one of the preceding claims, wherein the main frame fastening member (22) cooperates with a first portion (63a, 65a) of the circuit breaker assembly (62) to fasten the main frame member (21) thereto.
7. Apparatus according to any one of the preceding claims, wherein said at least one first sub-frame fastening member (42) cooperates with a second portion (63b, 65b) of the circuit breaker assembly (62) to fasten the main frame (21) and the first sub-frame member (37) thereto.
8. Apparatus according to any one of the preceding claims, wherein the main frame member (21), the first sub-frame member (37) and the second sub-

frame member (49) each comprise at least one aperture (26a, 26b, 46a, 46b, 56a, 56b) for receiving at least one securing device (70, 71).

9. Apparatus according to claim 8, wherein said at least one securing device (70, 71) comprises a pad-lock.
10. Apparatus according to any one of the preceding claims, wherein said at least first and second positions respectively comprise an ON position and an OFF position.
11. A method of securing a circuit breaker assembly (62) with locking apparatus (20) according to any one of the preceding claims, the circuit breaker assembly (62) comprising a movable actuator (64) which extends through a face plate (63) and has at least two positions, the method comprising the steps of:-

moving the main frame fastening member (22) into an aperture (65a) located at one end of the movable actuator (64) so as to seat the main frame member (21) adjacent the face plate (63);
moving the first sub-frame member (37) with respect to the main frame member (21) so as to move said at least one first sub-frame fastening member (42) into another aperture (65b) located at the other end of the movable actuator (64) so as to seat the first sub-frame member (37) adjacent the main frame member (21) and the face plate (63); and
moving the second sub-frame member (49) with respect to the main frame member to position the blocking member (51) so as to block substantial movement of the movable actuator (64).
12. A method according to claim 11, further comprising the step of inserting at least a segment (71) of at least one securing device (70) through at least one securing aperture (26a, 26b, 46a, 46b, 56a, 56b) of the main frame member (21), the first sub-frame member (37) and the second sub-frame member (49) to block securely substantial movement of the movable actuator (64).
13. A method according to claim 11 or 12, wherein the locking apparatus (20) covers at least a portion of the circuit breaker assembly (62).

Patentansprüche

1. Eine Verriegelungsvorrichtung (20) für eine Trennschalterbaugruppe (62), wobei diese Trennschal-

terbaugruppe aus einem Trennschalter und einem beweglicher Betätiger (64) besteht, welcher zwischen mindestens einer ersten Stellung und einer zweiten Stellung bewegt werden kann, um dadurch den Trennschalter zwischen mindestens einem ersten und einem zweiten Zustand umzuschalten; und wobei die Verriegelungsvorrichtung (20) Folgendes umfasst:

- ein Hauptrahmenteil (21);
- ein Hauptrahmen-Befestigungsteil (22) zum Befestigen des Hauptrahmentails (21) an der Trennschalterbaugruppe (62) relativ zu dem beweglicher Betätiger (64);
- ein erstes Unterrahmenteil (37);
- mindestens ein (1) erstes Unterrahmen-Befestigungsteil (42) zum Befestigen des Hauptrahmentails (21) an der Trennschalterbaugruppe (62) relativ zu dem beweglicher Betätiger (64); und
- einem zweiten Unterrahmenteil (49), das beweglich mit dem Hauptrahmenteil (21) verbunden ist.

Die Verriegelungsvorrichtung (20) ist **dadurch gekennzeichnet, dass** sie außerdem ein Sperrteil (51) zum Sperren jeder nicht unwesentlichen Bewegung des beweglichen Betätigers (64) zwischen mindestens dessen erster und dessen zweiter Stellung umfasst, sowie dadurch, dass das besagte, mindestens eine (1) Unterrahmen-Befestigungsteil (42) das erste Unterrahmenteil (37) an der Trennschalterbaugruppe (62) befestigt.

2. Eine Vorrichtung gemäß Anspruch 1, wobei das erste Unterrahmenteil (37) beweglich mit dem Hauptrahmenteil (21) verbunden ist.
3. Eine Vorrichtung gemäß Anspruch 1 oder 2, wobei das zweite Unterrahmenteil (49) drehbar gegenüber dem Hauptrahmenteil (21) angebracht ist.
4. Eine Vorrichtung gemäß einem beliebigen der vorhergehenden Ansprüche, wobei das erste (37) drehbar gegenüber dem Hauptrahmenteil (21) angebracht ist.
5. Eine Vorrichtung gemäß einem beliebigen der vorhergehenden Ansprüche, wobei das Hauptrahmenteil (21), das erste Unterrahmenteil (37) und das zweite Unterrahmenteil (49) so gestaltet sind, dass sie jede nicht unwesentliche Bewegung des beweglichen Betätigers (64) sicher sperren.

6. Eine Vorrichtung gemäß einem beliebigen der vorhergehenden Ansprüche, wobei das Hauptrahmen-Befestigungsteil (22) mit einem ersten Stück (63a, 65a) der Trennschalterbaugruppe (62) zusammenwirkt, um das Hauptrahmenteil (21) an der Trennschalterbaugruppe zu befestigen. 5
7. Eine Vorrichtung gemäß einem beliebigen der vorhergehenden Ansprüche, wobei das besagte mindestens eine (1) erste Unterrahmen-Befestigungsteil (42) mit einem zweiten Teilstück (63b, 65b) der Trennschalterbaugruppe (62) zusammenwirkt, um den Hauptrahmen (21) und das erste Unterrahmenteil (37) an der Trennschalterbaugruppe zu befestigen. 10
8. Eine Vorrichtung gemäß einem beliebigen der vorhergehenden Ansprüche, wobei das Hauptrahmenteil (21), das erste Unterrahmenteil (37) und das zweite Unterrahmenteil (49) jeweils mindestens eine (1) Öffnung (26a, 26b, 46a, 46b, 56a, 56b) zur Aufnahme mindestens einer (1) Sicherungsvorrichtung (70, 71) besitzen. 20
9. Eine Vorrichtung gemäß Anspruch 8, wobei die besagte mindestens eine (1) Sicherungsvorrichtung (70, 71) ein Vorhängeschloss umfasst. 25
10. Eine Vorrichtung gemäß einem beliebigen der vorhergehenden Ansprüche, wobei die besagten mindestens ersten und zweiten Stellungen eine EIN-Stellung und eine AUS-Stellung umfassen. 30
11. Ein Verfahren zum Sichern einer Trennschalterbaugruppe (62) mithilfe einer Verriegelungsvorrichtung (20) gemäß einem beliebigen der vorhergehenden Ansprüche, wobei diese Trennschalterbaugruppe (62) einen beweglichen Betätiger (64) besitzt, welcher durch eine Frontplatte (63) hindurchragt und mindestens zwei Stellungen hat; und wobei das Verfahren folgenden Schritte umfasst: 35
- Bewegen des Hauptrahmen-Befestigungsteils (22) in eine an einem Ende des beweglichen Betätigers (64) befindliche Öffnung (65a) hinein, um das Hauptrahmenteil (21) benachbart der Frontplatte (63) aufzusetzen; 40
 - Bewegen des ersten Unterrahmenteils (37) relativ zu dem Hauptrahmenteil (21), um das besagte mindestens eine (1) erste Unterrahmen-Befestigungsteil (42) in eine weitere, am anderen Ende des beweglichen Betätigers (64) befindliche Öffnung (65b) hinein, um das erste Unterrahmenteil (37) benachbart dem Hauptrahmenteil (21) und der Frontplatte (63) aufzusetzen; und 45
 - Bewegen des zweiten Unterrahmenteils (49) relativ zu dem Hauptrahmenteil, um das Sperrteil (51) so zu platzieren, dass jede nicht unwesentliche Bewegung des beweglichen Betätigers (64) gesperrt wird. 50
12. Ein Verfahren gemäß Anspruch 11, mit dem zusätzlichen Schritt, mindestens ein (1) Segment (71) mindestens einer Sicherungsvorrichtung (70) durch mindestens eine (1) Sicherungsöffnung (26a, 26b, 46a, 46b, 56a, 56b) des Hauptrahmenteils (21), des ersten Unterrahmenteils (37) und des zweiten Unterrahmenteils (49) hindurchzustecken, um jede nicht unwesentliche Bewegung des beweglichen Betätigers (64) sicher zu sperren. 55
13. Ein Verfahren gemäß Anspruch 11 oder 12, wobei die Verriegelungsvorrichtung (20) die Trennschalterbaugruppe (62) mindestens teilweise abdeckt.

Revendications

1. Dispositif de blocage (20) pour un ensemble de disjoncteur (62) comprenant un disjoncteur et un actionneur mobile (64) qui peut se déplacer entre au moins une première position et une deuxième position pour actionner le disjoncteur entre respectivement au moins un premier état et un deuxième état, le dispositif de blocage (20) comprenant :

un élément formant cadre principal (21);
 un élément de fixation de cadre principal (22) destiné à fixer l'élément formant cadre principal (21) sur l'ensemble de disjoncteur (62) par rapport à l'actionneur mobile (64) ;
 un élément formant cadre secondaire (37) ;
 au moins un premier élément de fixation de cadre secondaire (42) destiné à fixer l'élément formant cadre principal (21) sur l'ensemble de disjoncteur (62) par rapport à l'actionneur mobile (64) ; et
 un deuxième élément formant cadre secondaire (49) associé de manière mobile à l'élément formant cadre principal (21) ;

caractérisé en ce que le dispositif de blocage comprend, en outre, un élément de blocage (51) permettant de bloquer sensiblement le mouvement de l'actionneur mobile (64) au moins entre ses première et deuxième positions, et **en ce que** ledit au moins un élément de fixation de cadre secondaire (42) fixe le premier élément formant cadre secondaire (37) sur l'ensemble de disjoncteur (62).

2. Dispositif selon la revendication 1, dans lequel le premier élément formant cadre secondaire (37) est associé de manière mobile à l'élément formant ca-

dre principal (21).

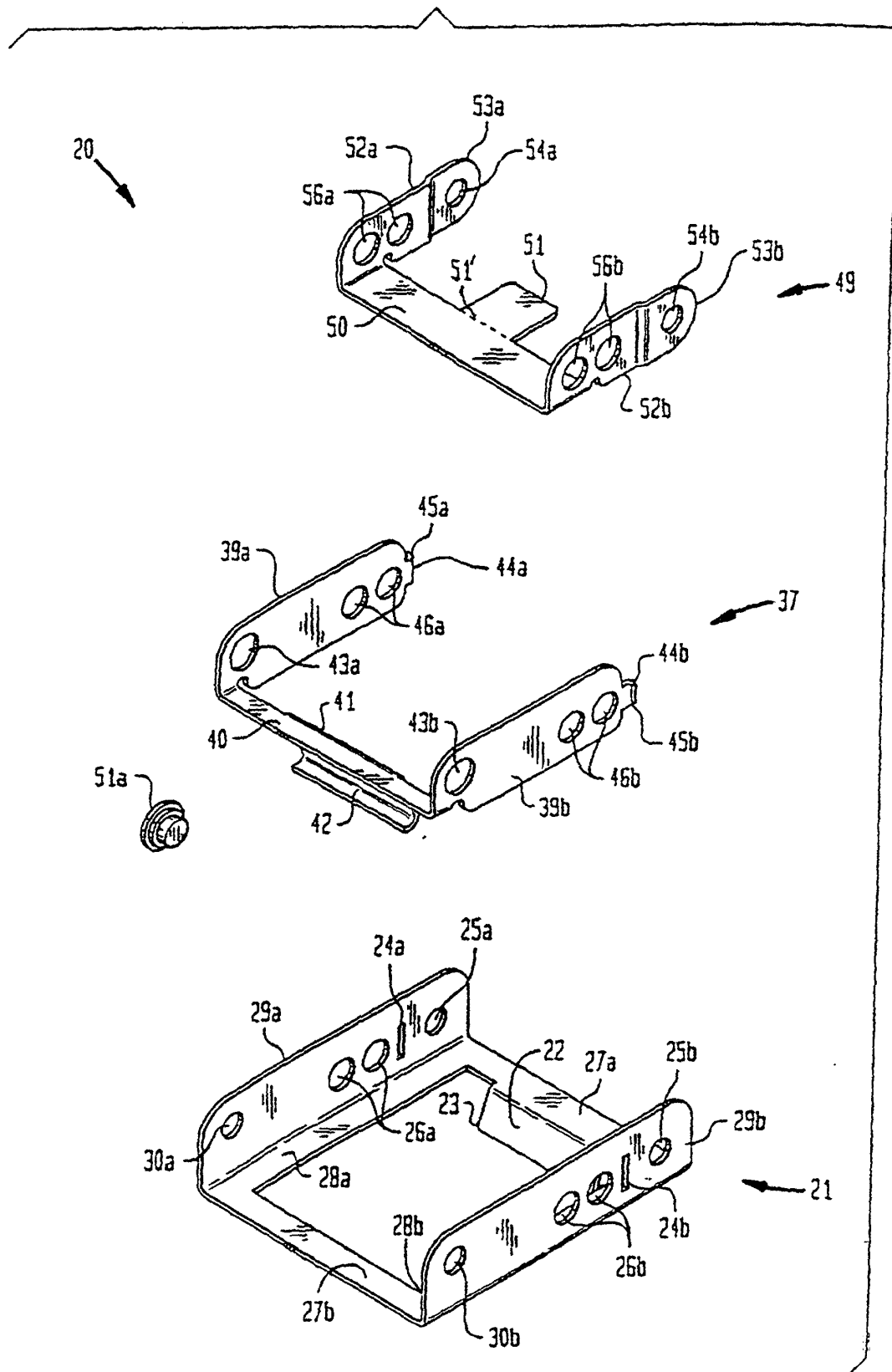
3. Dispositif selon la revendication 1 ou 2, dans lequel le deuxième élément formant cadre secondaire (49) est monté de façon pivotante par rapport à l'élément formant cadre principal (21). 5
4. Dispositif selon l'une quelconque des revendications précédentes, dans lequel le premier élément formant cadre secondaire (37) est monté de façon pivotante par rapport à l'élément formant cadre principal (21). 10
5. Dispositif selon l'une quelconque des revendications précédentes, dans lequel l'élément formant cadre principal (21), le premier élément formant cadre secondaire (37) et le deuxième élément formant cadre secondaire (49) sont adaptés pour bloquer de manière sûre un mouvement sensible de l'actionneur mobile (64). 15 20
6. Dispositif selon l'une quelconque des revendications précédentes, dans lequel l'élément de fixation de cadre principal (22) coopère avec une première portion (63a, 65a) de l'ensemble de disjoncteur (62) pour y fixer l'élément formant cadre principal (21). 25
7. Dispositif selon la revendication 5, l'une quelconque des revendications précédentes, dans lequel ledit au moins un premier élément de fixation de cadre secondaire (42) coopère avec une deuxième portion (63b, 65b) de l'ensemble de disjoncteur (62) pour y fixer l'élément formant cadre principal (21) et le premier élément formant cadre secondaire (37). 30 35
8. Dispositif selon l'une quelconque des revendications précédentes, dans lequel l'élément formant cadre principal (21), le premier élément formant cadre secondaire (37) et le deuxième élément formant cadre secondaire (49) comprennent chacun au moins une ouverture (26a, 26b, 46a, 46b, 56a, 56b) destinée à recevoir au moins un dispositif de fixation (70, 71). 40
9. Dispositif selon la revendication 8, dans lequel ledit au moins un dispositif de fixation (70, 71) comprend un cadenas. 45
10. Dispositif selon l'une quelconque des revendications précédentes, dans lequel lesdites au moins première et deuxième positions comprennent respectivement une position MARCHE et une position ARRÊT. 50
11. Procédé de fixation d'un ensemble de disjoncteur (62) muni d'un dispositif de blocage (20) selon l'une quelconque des revendications précédentes, l'ensemble de disjoncteur (62) comprenant un action-

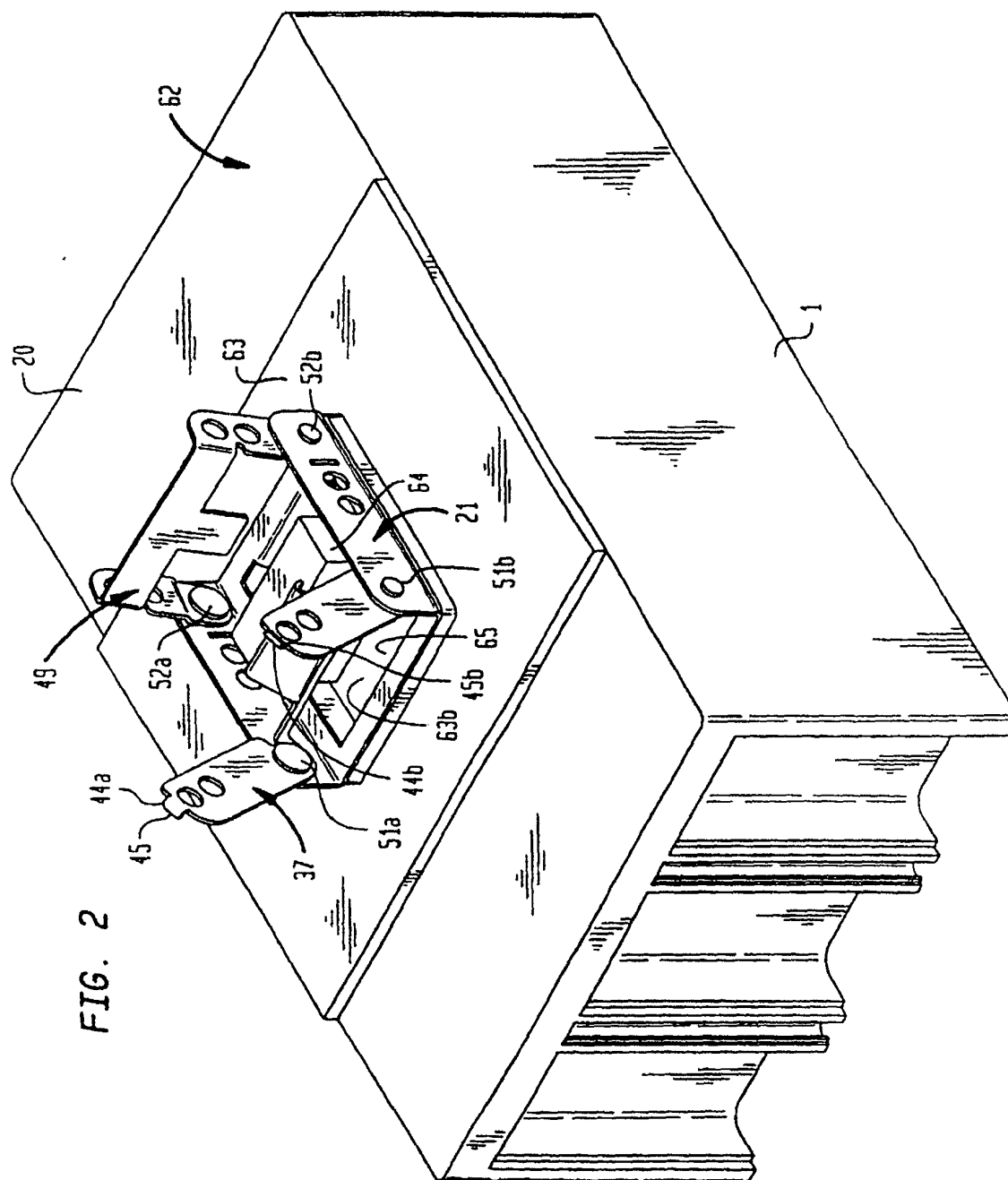
neur mobile (64) qui s'étend à travers une plaque frontale (63) et a au moins deux positions, le procédé comprenant les étapes consistant à :

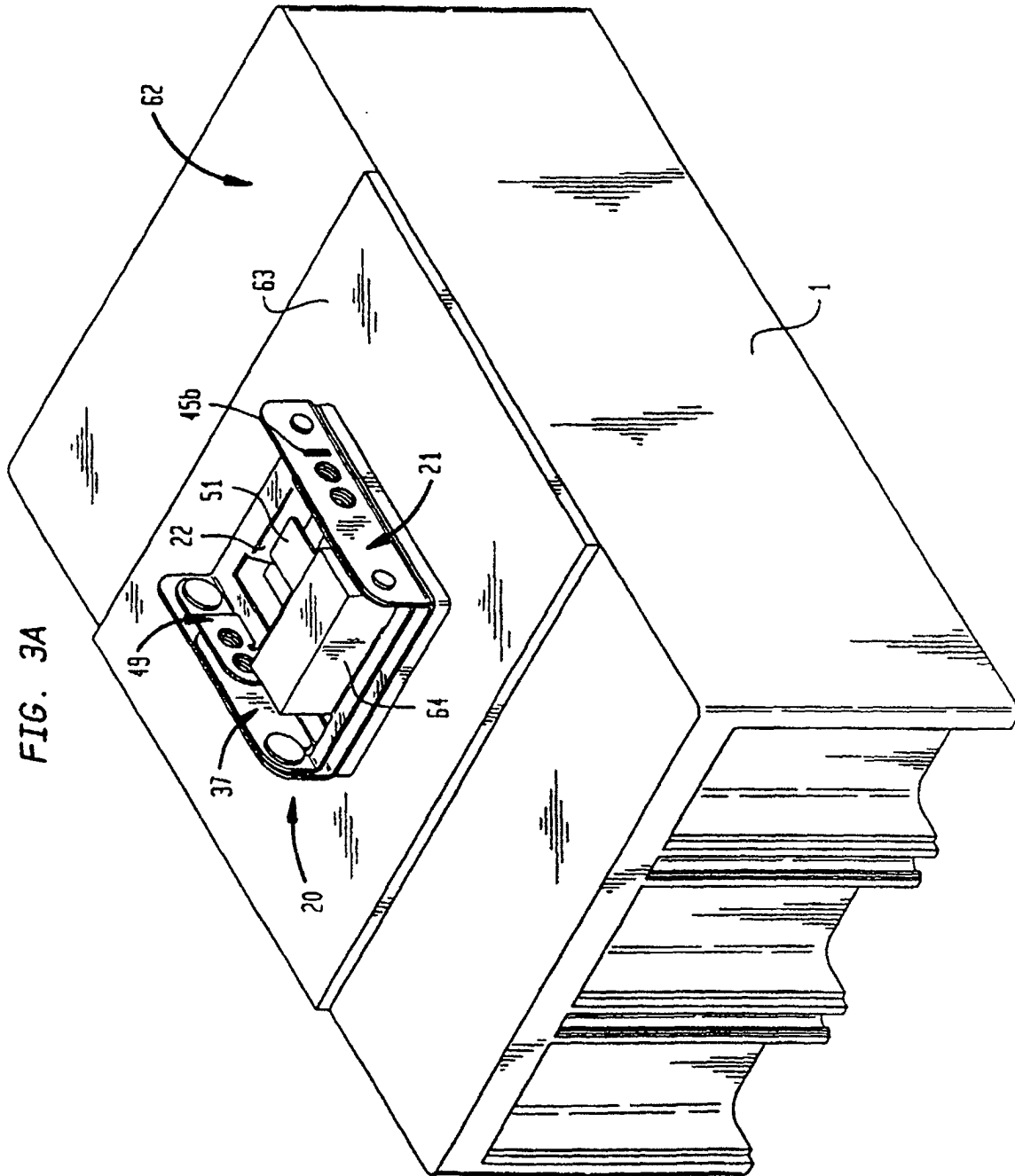
déplacer l'élément de fixation de cadre principal (22) dans une ouverture (65a) située à une extrémité de l'actionneur mobile (64) afin de placer l'élément formant cadre principal (21) dans une position adjacente à la plaque frontale (63) ;
 déplacer le premier élément formant cadre secondaire (37) par rapport à l'élément formant cadre principal (21) pour déplacer ledit au moins un élément de fixation de cadre secondaire (42) dans une autre ouverture (65b) située à l'autre extrémité de l'actionneur mobile (64) afin de placer le premier élément formant cadre secondaire (37) dans une position adjacente à l'élément formant cadre principal (21) et à la plaque frontale (63) ; et
 déplacer le deuxième élément formant cadre secondaire (49) par rapport à l'élément formant cadre principal pour positionner l'élément de blocage (51) de façon à bloquer un mouvement sensible de l'actionneur mobile (64).

12. Procédé selon la revendication 11, comprenant en outre l'étape consistant à insérer au moins un segment (71) dudit au moins un dispositif de fixation (70) à travers au moins une ouverture de fixation (26a, 26b, 46a, 46b, 56a, 56b) de l'élément formant cadre principal (21), du premier élément formant cadre secondaire (37) et du deuxième élément formant cadre secondaire (49) pour bloquer en toute sécurité un mouvement sensible de l'actionneur mobile (64).
13. Procédé selon la revendication 11 ou 12, dans lequel le dispositif de blocage (20) couvre au moins une portion de l'ensemble de disjoncteur (62).

FIG. 1







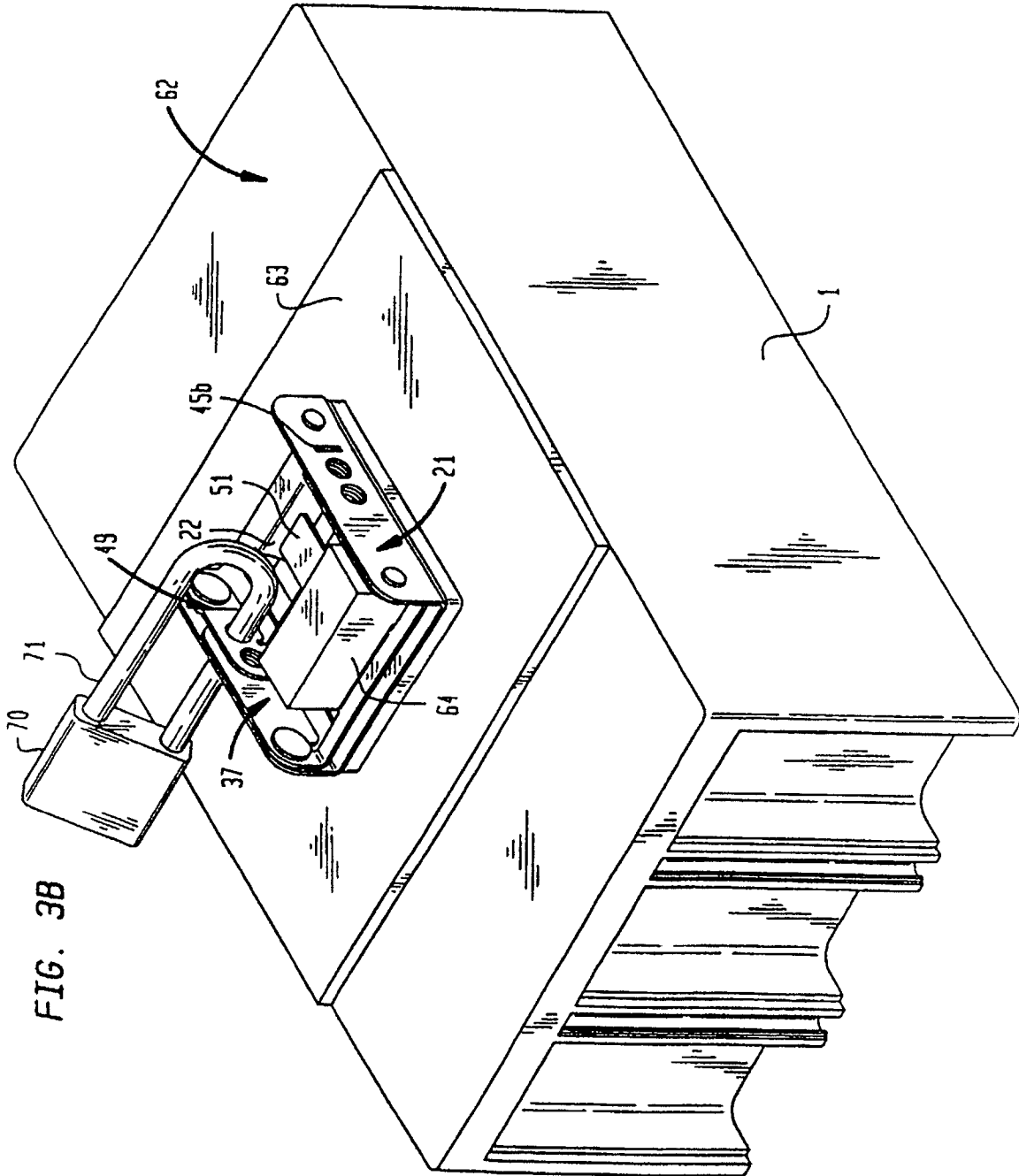


FIG. 3B

FIG. 4

