Nov. 4, 1969 C. E. GRYCTKO 3,477,044

CIRCUIT BREAKER MECHANISM MOUNTING PLATE ASSEMBLY

Filed April 19, 1967 3 Sheets-Sheet 1

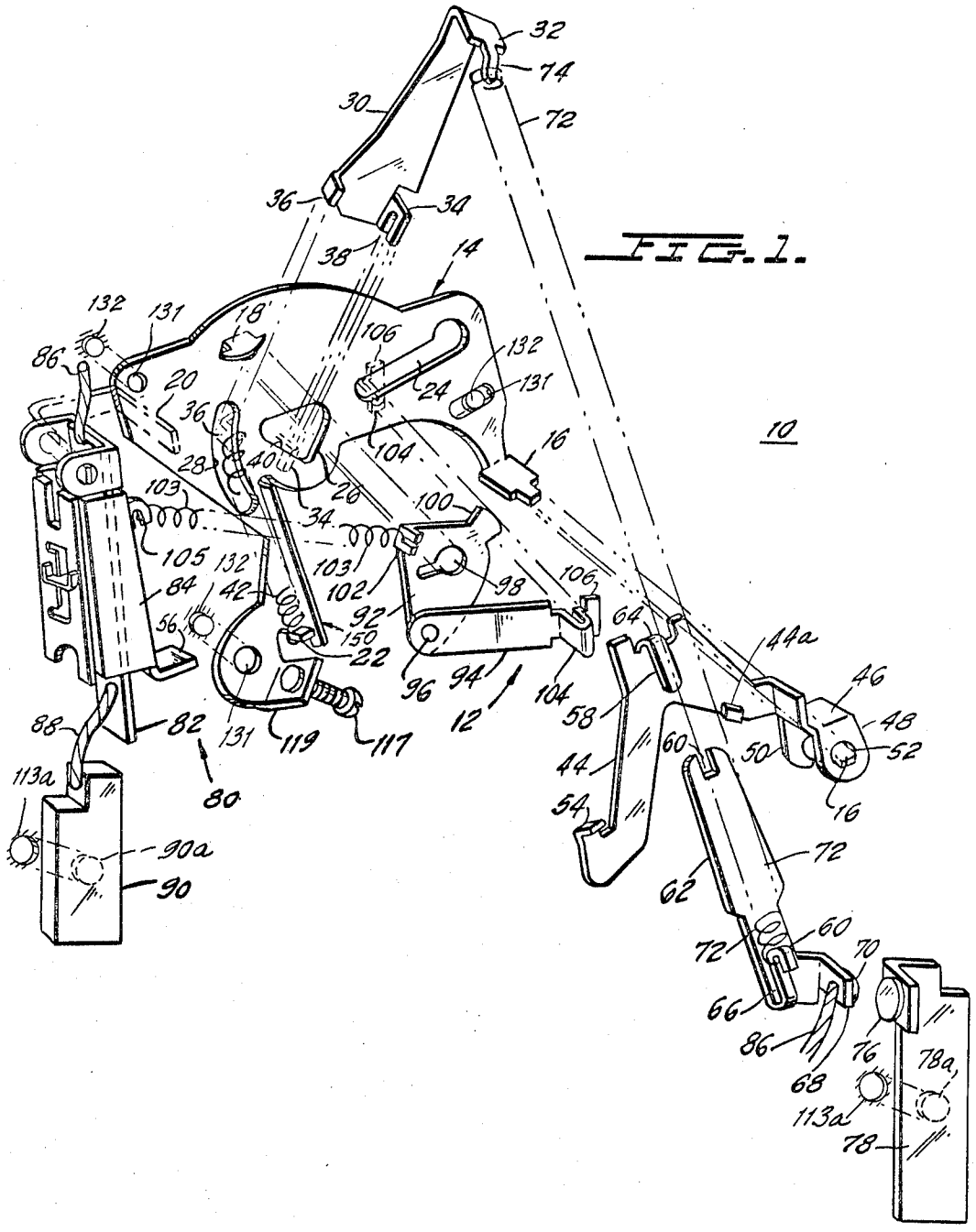


FIG. 1.

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CIRCUIT BREAKER MECHANISM MOUNTING PLATE ASSEMBLY

Filed April 19, 1967 3 Sheets-Sheet 2

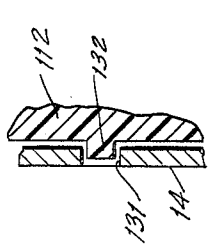


FIG. 2A.

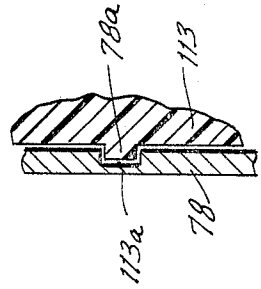


FIG. 2B.

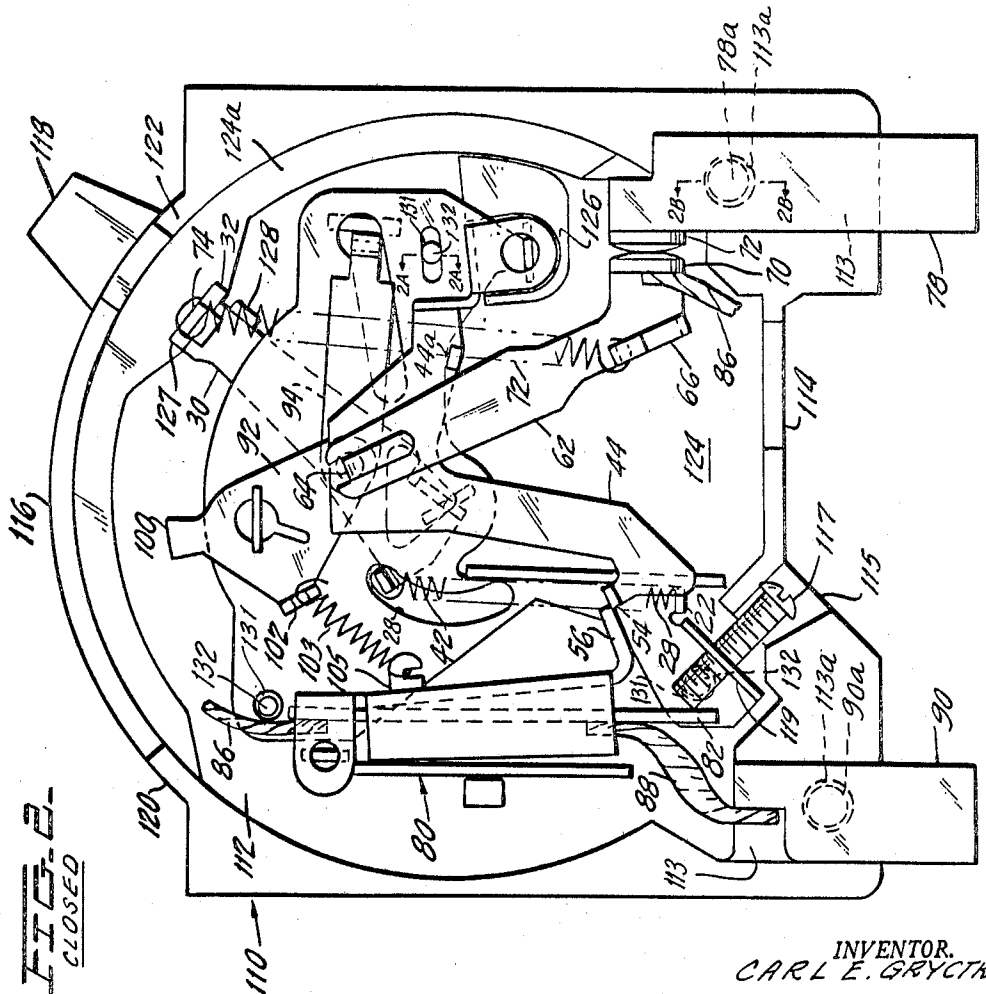


FIG. 2. CLOSED

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CIRCUIT BREAKER MECHANISM MOUNTING PLATE ASSEMBLY

Filed April 19, 1967 3 Sheets-Sheet 3

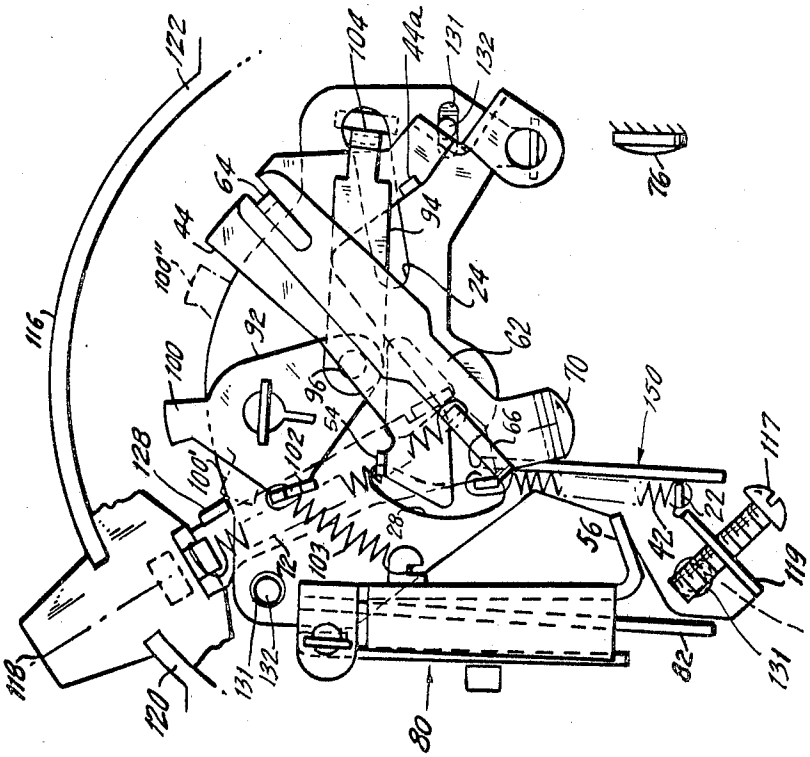


FIG. 4.
TRIPPED

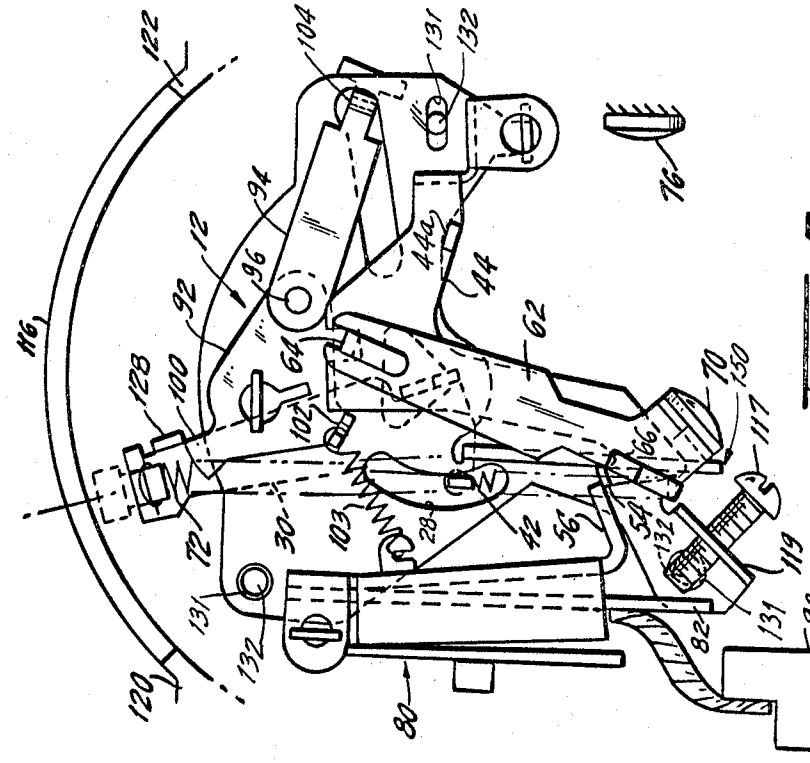


FIG. 3.
OFF

United States Patent Office 3,477,044 Patented Nov. 4, 1969

3,477,044

CIRCUIT BREAKER MECHANISM MOUNTING PLATE ASSEMBLY

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Filed Apr. 19, 1967, Ser. No. 632,045
Int. Cl. H01h 9/00, 13/02
U.S. Cl. 335—23 5 Claims

ABSTRACT OF THE DISCLOSURE

A separate mounting plate having apertures and upraised tabs for receiving and mounting the movable components of the mechanism of a circuit breaker; the mounting plate being positionable in a preformed circuit breaker casing, whereby all of the movable components of the circuit breaker may be mounted either directly or indirectly on the mounting plate instead of being mounted on receiving elements molded into the circuit breaker casing.

This invention relates to electric circuit breaker component mounting means and more particularly to a separable circuit breaker mechanism mounting plate assembly disposed within a circuit breaker casing.

In recent years there has been considerable effort expended in the electrical industry to reduce the size of circuit protective equipment. For example, in the area of small air circuit breakers of the type with which the instant invention is intended to cooperate, the industry has seen acceptance of one-half inch wide circuit breakers as a substitute for the long accepted one inch wide breaker. Further evidence of the present emphasis on reduction in size and simplicity in design is evidenced by United States patent application Ser. No. 587,709, now Patent No. 3,347,574 filed Oct. 19, 1966, entitled "Circuit Breaker Resetting and Closing Mechanism," and assigned to the assignee of the instant invention, where there has been described in great detail a novel circuit breaker which has achieved utmost simplicity in design and maximum reduction in overall size.

Simultaneously with the development of smaller and more simplified circuit breakers, and related thereto, engineers have re-examined the operating characteristics of small circuit breakers and looked for ways in which the manufacture thereof might be simplified. They have also sought ways to make these circuit breakers more durable.

Circuit breakers of the prior art generally have a casing comprised of a moldable plastic material, which has its internal walls so molded as to provide upraised lugs and tabs and to provide indentations and apertures for receiving and mounting various discrete elements comprising a circuit breaker. This complicates the housing molding operation by requiring unnecessary critical dimensional tolerances in the completed molded structure. Furthermore, these mounting elements, being made of plastic, may wear out more rapidly than desired and are not as strong and durable as metallic mounting elements would be.

To overcome these difficulties, the present invention contemplates providing a circuit breaker with a common, relatively flat (vis-a-vis the breaker casing) mounting plate upon which nearly all movable components of the operating mechanism of the circuit breaker may be directly secured and to which the remainder of the movable components of the circuit breaker mcehanism may be indirectly secured. The plate is provided with various apertures and upraised tabs to which the components

of the circuit breaker mechanism are mounted and which, as needed, serve as points or surfaces about which various components of the circuit breaker mechanism may pivot.

For illustrative purposes, the movable breaker components may comprise a movable contact, a breaker trip mechanism to separate the movable contact from a stationary one, a circuit reclosing or relatching mechanism to reclose the tripped open contacts, and a handle for manually opening and closing the breaker contacts.

The circuit breaker mechanism mounting plate assembly, being itself thin, helps minimize the width of a circuit breaker in which it is employed. Being separate from the breaker casing, the mounting plate assembly with its tabs and apertures, need not be formed of the same material as the molded breaker casing. Thus, it can be formed of a more durable material, such as steel, whereby the rubbing between the movable components and the mounting plate assembly will not readily wear down the mounting plate assembly tabs and pivot surfaces. Further, the mounting plate assembly can be readily formed by cutting or stamping. If the breaker casing itself contains the mounting means for the movable breaker components, the casing must be molded to critical tolerances, which is more difficult than cutting or stamping a flat plate comprised of metal. In addition, the breaker components can be mounted to the mounting plate assembly before that assembly is positioned in the breaker casing, whereby the assembler of the breaker components need not operate within the confined space of the breaker casing.

Accordingly, it is an object of the present invention to provide a circuit breaker mechanism mounting plate assembly adapted to minimize the width of a circuit breaker.

It is another object of the present invention to provide a circuit breaker mechanism mounting plate assembly which is formed separately from and can be inserted into a preformed circuit breaker casing.

It is another object of the present invention to provide a circuit breaker mechanism mounting plate assembly including means for receiving and mounting the components of a circuit breaker.

It is a further object of the present invention to provide a circuit breaker mechanism mounting plate assembly upon which the movable circuit breaker components can be either directly or indirectly mounted prior to the insertion of the mounting plate assembly into the preformed circuit breaker casing.

Other objects and a fuller understanding of the instant invention may be had by referring to the following description and drawings, in which:

FIGURE 1 is an exploded perspective view of the internal components of a circuit breaker constructed in accordance with the teachings of the instant invention, and including the circuit breaker mechanism mounting plate assembly of the instant invention;

FIGURE 2 is a plan view, with the cover removed, of the circuit breaker of FIGURE 1, with the operating mechanism thereof in the "on" position;

FIGURE 2A is a section along the line and in the direction 2A—2A of FIGURE 2 and illustrates the mounting for the mounting plate assembly of the instant invention;

FIGURE 2B is a section along the line and in the direction 2B—2B of FIGURE 2 and illustrates the mounting for the circuit breaker stab terminals;

FIGURE 3 is a partial view of the circuit breaker of FIGURE 2, with the parts thereof in the "off" position; and

FIGURE 4 is a view similar to FIGURE 3, but showing the circuit breaker in the "tripped" position.

Referring to FIGURE 1, there is shown the internal mechanism **10** of a circuit breaker constructed in accordance with the principles of the instant invention. It is reemphasized that although the circuit breaker mechanism mounting plate assembly **14** of the instant invention will be specifically described with respect to the internal mechanism **10** shown in application Serial No. 587,709, now Patent No. 3,377,574, it is to be understood that such disclosure is intended in no way to limit the application of the instant invention, since the instant invention is equally applicable to any circuit breaker mechanism.

Similarly, it is to be understood that although the instant invention will be described with respect to a circuit breaker for the protection of a single phase of current, the instant invention can be readily employed in a multi-phase circuit breaker, e.g. by using a plate assembly in every phase of a multi-phase circuit breaker.

The circuit breaker mechanism **10** includes the common plate **14** of the instant invention, which is integrally provided with the following parts: an upstanding cradle-pivoting tab **16**; an upstanding relatching-pivoting tab **18**; an upstanding tripper mechanism-pivoting tab **20**; and an upstanding spring-retaining tab **22**. In addition the plate **14** includes an elongated slot **24**; a generally centrally located operating handle-pivoting aperture **26**; and an arcuate slot **28** which receives an upstanding tab portion of the operating handle **30**, as hereinafter described. The combination of the common plate **14** and the aforementioned tabs, apertures and slots comprises the mounting plate assembly of the instant invention.

To carry out the objects of the present invention, the mounting plate **14** is preferably very thin and flat as compared with the width of the latter described circuit breaker casing **110**, with the exception of the upstanding tabs. The material of which the common mounting plate **14** is comprised is not critical to the instant invention and may be any substance which can be formed or molded as required by this invention, e.g. any plastic material and any metal. However, since the operating or moving parts of the circuit breaker are mounted to the common plate **14**, the plate **14** is preferably comprised of a material, such as steel, which will not be worn by the repeated relative movements of the circuit breaker components with respect to the mounting plate **14**. Furthermore, if a metal such as steel is employed, the mounting plate can be manufactured by first cutting or punching an appropriate pattern from a flat sheet of metal. Then, apertures in appropriate places can be cut out; and upstanding tabs can be formed merely by cutting the plate in proper places and then bending to an upstanding condition all of the necessary tabs. Alternatively, an entire mounting plate assembly could be simply formed by stamping a sheet of metal in an appropriately shaped die.

The common mounting plate of the instant invention can be readily manufactured separately from a casing for the circuit breaker in which the plate is to be employed. As desired, all movable components of the circuit breaker can be mounted to the mounting plate before it is placed within the circuit breaker casing, thereby making the assembly of circuit breaker components easier. A circuit breaker with which the mounting plate assembly of the instant invention can be employed is now described.

The operating handle **30** of the circuit breaker includes an upstanding knob receiving tab **32** at one end thereof, and a pair of upstanding tabs **34** and **36** at the opposite end thereof. Tab **34** is provided with an open-ended slot **38** which fits over a portion **40** of the mounting plate defining the aperture **26** whereby the operating handle **30** may experience rotation in a plane parallel to the plane of the mounting plate **14** about the point **40**. The second tab **36** of the operating handle **30** is freely received within the arcuate slot **28** and extends forward of the mounting plate **14** when the operating handle **30** is placed behind the mounting plate **14** with the open-ended slot **38** riding on the point **40**. The handle **30** is

thus directly mounted to the plate **14**. Biasing means in the form of spring **42** is secured at one end thereof to the tab **36** and at the opposite end thereof to the upstanding spring-retaining tab **22** so as to constantly bias the operating handle **30** in a counterclockwise direction in FIGURE 1 about the pivot defined by the slot **38** and point **40**.

A cradle **44** includes a bifurcated end **46**, the two arms **48** and **50** of which include aligned apertures **52** which receive the cradle pivoting tab **16** of the mounting plate **14**. The cradle **44** is thus also directly mounted to the plate **14**. The opposite end of the cradle **44** includes an upstanding latch tip **54** which cooperates with the latch **56** of the tripping mechanism **80**, as will be described in further detail. Intermediate the ends of the cradle **44** is an overturned tab **58** which cooperates with an open-ended slot **60** provided at one end of a movable contact arm **62** to permit rotation of the movable contact arm **62** about point **64** on the cradle **44** when the movable contact arm **62** is inserted up and under the over-turned tab **58**. Being mounted to the cradle **44**, the movable contact arm is indirectly mounted to the plate **14**. Cradle **44** has a kicker projection **44***a* which aids in separating the breaker contacts in the event the breaker is tripped, as is described below.

The opposite end of the movable contact arm **62** integrally carries a generally S-shaped spring-retaining portion **66** and also carries a generally L-shaped portion **68** which carries the movable contact pad **70** thereon. Disposed opposite to the movable contact pad **70** is a stationary contact pad **76** secured to the stationary stab terminal **78** of the breaker. The contact pads **70** and **76** comprise the cooperating contacts in the breaker.

A main operating spring **72** is secured at one end thereof to the S-shaped spring-retaining portion **66** and at the opposite end thereof to a spring-retaining portion **74** which is an integral portion of the upstanding knob-retaining portion **32** of the operating handle **30**.

The tripping mechanism generally designated at **80** includes a bimetallic element **82** and a magnetic element **84** to which is secured the latch **56**. As explained in greater detail below and in copending patent application Ser. No. 692,561 filed Dec. 21, 1967, in the name of F. Myers and W. Goodnow, entitled "Circuit Breaker Thermal and Magnetic Tripping Mechanism," which is assigned to the assignee of the instant invention, in response to predetermined overload or instantaneous fault conditions, tripper mechanism **80** will rotate clockwise in FIGURE 1 to move the latch **56** out of engagement with the latch tip **54** of cradle **44** to permit cradle **44** to rotate clockwise causing kicker projection **44***a* to strike movable contact support arm **62** causing it to rotate clockwise and separating movable contact **70** from stationary contact **76**. The blow drives arm **62** to rotate over center part pivot **64** and the main operating spring **72** causes further clockwise rotation of contract arm **62** until arm **62** strikes tip **54** of cradle **44** which halts the arm **62**. Hence, tripping mechanism **80** interrupts current flow through the path defined by stab **78**, stationary contact pad **76**, movable contact pad **70**, conductive braid **86**, bimetallic element **82**, conductive braid **88**, and stab **90**. The tripping mechanism has an aperture **89** through which is passed mounting plate tab **20**, about which tab tripping mechanism **80** pivots. Thus the tripping mechanism is directly mounted to plate **14**. The tripping mechanism is part of a circuit interruption mechanism, the other part of which is handle **30**. Either handle **30**, as will be discussed below, or mechanism **80** can be used to separate movable contact **70** from stationary contact **76**.

The automatic relatching means **12** employed in conjunction with the mounting plate assembly of the instant invention is more fully set out in copending patent application Ser. No. 587,709, now Patent No. 3,377,574, which is assigned to the assignee of the instant invention, and includes first and second members **92** and **94**, respectively, which are joined as by a pin **96** for rotation relative

to one another. The first member **92** includes a centrally located aperture **98** which is received and carried by the upstanding pivot point **18** on mounting plate **14** to permit rotation of the linkage assembly relative to the plate **14**. Hence, automatic relatching means **12** is directly mounted to plate **14**. The first member **92** also includes a pair of actuating surfaces **100** and **102**, for purposes to be further explained, while the second member **94** terminates in an upstanding actuating surface **104** which itself terminates in a rearwardly disposed portion **106** which lies in a plane behind the planar surface of the second member **94** so that it may ride behind the mounting plate **14** with the upstanding actuating surface **104** projecting through the elongated slot **24** and beyond the front surface of the plate **14**. It may be noted that actuating surface **102** of member **92** retains one end of a biasing spring **103**, the opposite end of which is secured to a hook-like projection **105** provided on the tripping mechanism **80** to constantly bias the first member **92** of the automatic relatching mechanism in a counterclockwise direction about the pivot point **18**. Relatching means **12** is part of a circuit reclosing mechanism, the other part of which is handle **30**. Either handle **30**, as will be discussed below, or means **12** can be used to re-engage movable contact **70** and stationary contact **76**.

The various circuit breaker components, including the relatch mechanism **12**, the cradle **44**, the movable contact arm **60**, and the operating handle **30** and all upstanding tabs on these components, are made as thin as possible, in comparison with the width of the breaker casing, in order to minimize the width of the completed circuit breaker. To accomplish this aim, these various circuit breaker components can, in the same manner as the mounting plate assembly, be formed from a single sheet of material, such as steel.

All of the movable circuit breaker components may be mounted to the plate **14** before it is mounted in the below described casing **110**. At the option of the assembler, various components may be mounted after the plate **14** has been mounted in the casing **110**.

While the circuit breaker components are herein shown mounted by means of tabs and apertures, any component might be mounted with any other securing means, such as screws, pins or rivets.

Referring to FIGURE 2, there is shown the manner in which the circuit breaker operating mechanism **10** cooperates within a circuit breaker casing generally indicated at **110**. The casing **110** normally includes a cover, not shown, which when removed reveals the mechanism housing cavity **112**. The casing walls include appropriately located passageways **113** for stabs **78** and **90**; a passageway **114** to permit the exit of gases generated during circuit interruption in the manner taught by United States patent application Serial No. 565,500 filed July 29, 1966, in the name of Carl E. Gryctko, and assigned to the assignee of the instant invention; and a passageway **115** provided through the outer casing wall to house an adjusting screw **117** which is screw-threaded through an upstanding tab **119** provided on the mounting plate **14** to vary the position of the bimetallic element **82** and hence the entire tripping mechanism **80** relative to the latch tip **54** of cradle **44**. (Note that the tripping assembly **80** is constantly biased in a counterclockwise direction in FIGURE 2 by the biasing spring **103** secured between the hook-like projection **105** on the tripping mechanism and the actuating surface **102** provided on the first member **92** of the automatic relatching mechanism.) The external casing wall is also removed at **116** through which an operating knob **118** may be secured to the operating handle **30** of the internal mechanism in a manner to be further described. The upper arcuate opening **116** is defined at opposite ends thereof by casing wall projections **120** and **122**.

The stab terminals **78** and **90** are positioned within the above noted casing passageways **113**. Passageways **113** have depressions **113***a* into which are fitted bosses **78***a* and **90***a* to retain the stab terminals **78** and **90** in stationary condition (see FIGURE 2B). The only circuit breaker components that are not either directly or indirectly mounted to the mounting plate assembly **14** are the stab terminal **78** which bears the stationary contact **76** and the stab terminal **90**. These components remain stationary during circuit breaker operation.

In the interior cavity **112** and upstanding from the rear wall **124** of the casing **110** there is provided an internal generally U-shaped projection **126** which houses the bifurcated end **46** of the cradle **44** which in turn is pivoted upon the tab **16** of the mounting plate **14**.

The mounting plate **14** has apertures **131** for receiving positioning means for said plate. Molded to the casing wall are lugs **132** (see FIGURE 1) which are positioned to register with and pass through apertures **131** (see FIGURE 2A) to retain plate **14** in position within casing **110**. Alternatively, other securing means, e.g. screws and rivets, might be used to position plate **14**. The circuit breaker casing need contain no other projections, tabs, or apertures for mounting the circuit breaker components since the mounting plate assembly contains mounting means for all of the movable breaker components. Thus, manufacture of circuit breaker casings is made easier and the casing need not be formed or otherwise firmed to critical tolerances to be able to position all breaker components as is required in other circuit breakers.

The operating knob **118** of the circuit breaker is actually an integral portion of a one-piece arc-like member **124***a* which is guided for movement within the interior **112** of the casing **110** by the internal surfaces of the casing walls as well as by the upstanding projection **126**. The arc-like member **124***a* has a cutout notch **127** which receives the upstanding tab **32** of the operating handle **30** whereby rotation of the knob **118** between limits defined by wall projections **120** and **122** will similarly rotate the operating handle **30**. After all components have been assembled in the base portion of the circuit breaker casing, the cover (not shown) of the circuit breaker casing is positioned over the base portion and it is secured thereto by a conventional securing means. Thus, there has been described a circuit breaker mechanism mounting plate assembly adapted for receiving and mounting a circuit breaker operating mechanism and designed to reduce the size and width of the circuit breaker, to simplify the manufacture thereof and to make the elements mounting the circuit breaker components sturdier and more resistant to wear through use.

The operation of the circuit breaker will now be described. In FIGURE 2 the circuit breaker is in the "on" position, that is, with the contact pads **70** and **76** completing a circuit path through the stab **78**, contact pads **70**, **76**, the conductive braid **86**, the bimetallic element **82**, the conductive braid **88** and through the stab **90**. In the "on" condition, the latch **56** of the tripping mechanism **80** is in a blocking relationship with respect to the latch tip **54** of cradle **44**, with the operating spring **72** biasing the movable contact arm **62** in a counterclockwise direction about point **64** on cradle **44** to maintain the movable contact pad **70** in firm electrical contact with the stationary pad **76**.

It will further be observed that in the "on" position, biasing spring **103** attempts to establish as short a distance as possible between the projection **105** on the tripping mechanism **80** and the actuating surface **102** on the first member **92** of the automatic relatching assembly whereby the planar actuating surface **100** of member **92** is necessarily so positioned as to be in the path of movement of an upstanding tab **128** (which cannot be seen in FIGURE 1) provided on the operating handle **30**.

The function of this last mentioned upstanding tab **128** on the operating handle **30** may best be understood by referring to FIGURE 3 wherein the operating handle **30** has been manually moved from its "on" position to an

"off" position intermediate the projections **120** and **122**, and during which time the operating spring **72** has moved over point **64** on the cradle **44** to rotate the movable contact support arm **62** from its "on" position to its "off" position. The movable contact support arm moves clockwise, as viewed in FIGURES 2 and 3, until it engages mounting plate flange **150** where its motion is halted. Note that since the opening of the circuit breaker was by manual operation and not in response to the occurrence of a fault, the circuit breaker is in an "off" position rather than the tripped position, with the cradle **44** still being latched by the cooperation of latch **56** and latch tip **54**.

As can be most clearly seen in FIGURE 3, the operating handle **30** is maintained in the "off" position by the cooperation of actuating surfaces **100** and **102** of member **92** with the upstanding tab **128** and the cradle **44**, respectively. Specifically, as the operating handle **30** is rotated by means of the knob **118** counterclockwise in FIGURE 3, the tab **128** on the operating handle **30** engages the actuating surface **100** of member **92**. However, with the cradle **44** latched, further counterclockwise rotation of the member **92** of the automatic relatching assembly **12** is prevented by the engagement of the upstanding actuating surface **102** thereon with the cradle **44**.

To reclose the contacts, knob **118** is moved clockwise, as viewed in FIGURE 3. When handle **30** passes over pivot **64**, operating spring **72** snaps movable contact **70** into engagement with stationary contact **76**.

Starting with the circuit breaker in its "on" condition of FIGURE 2 and turning now to FIGURE 4, it will be assumed that a time-delayed or instantaneous fault current has been detected by the tripping mechanism **80** so as to rotate latch **56** from its blocking position with respect to the latch tip **54** of cradle **44**. The movable contact support arm **62** is still in the position shown in FIGURE 2. The pull exerted by spring **72** on spring retaining portion **66** pulls portion **66** toward spring retainer **74**. This exerts a force on point **64** of cradle **44**, thus causing the cradle, which is no longer restrained by latch **56** from clockwise rotation, to begin to rotate clockwise. Spring retainer **74**, point **64** and portion **66** comprise a toggle and as spring **72** collapses and pulls up on portion **66**, it causes the toggle to collapse, whereby movable contact **70** wipes over stationary contact **76**. After cradle **44** has rotated a distance, the kicker projection **44***a* secured thereto strikes the movable contact support arm **62**, and the impact separates the movable contact **70** from the stationary contact **76** and rotates movable contact support arm **62** beyond point **64**.

As cradle **44** rotates, when point **64** passes to the right (as viewed in FIGURE 2) of the force line of spring **72**, the toggle formed by spring retainer **74**, point **64** and portion **66**, collapses in the opposite direction from the previous direction of collapse of the said toggle. During this rotation of cradle **44**, contact arm **62** is rotated away from stationary contact **76** with the help of kicker projection **44***a*.

Once spring **72** has passed beyond, or to the left as viewed in FIGURE 2, of the handle arm pivot **26**, the handle **118** rotates counterclockwise. At this stage the spring **72** although not necessarily completely relaxed, is not tense sufficiently to rotate farther past surface **100** of member **92**.

Spring **42** is provided to pull handle **118** further to the left, rotating the member **92** counterclockwise so that the handle trip position is realized (FIGURE 4) and the tab **128** is in position for latching and reclosing the circuit breaker.

As can be seen in FIGURE 4, cradle **44** rotates clockwise until it abuts actuating surface **104** which stops cradle **44**. Movable contact support **62** rotates until it strikes mounting plate flange **150** which prevents further opening of contact **70**.

Since flange **150** halts the rotation of arm **62** when the breaker is in both the "off" and "tripped" position, and since cradle **44** rotates further in the "tripped" condition, movable contact **70** is further from stationary contact **76** in the "tripped" than in the "off" condition.

As was noted above, with the aid of biasing spring **42**, the operating handle **30** is urged through its "off" position in FIGURE 3 to its tripped position in FIGURE 4, it being noted that the upstanding tab **128** thereon is now free to rotate member **92** counterclockwise since the actuating surface **102** thereof is no longer restrained by the cradle **44** as it was in FIGURE 3. It is to be noted that while member **92** is being rotated counterclockwise, biasing spring **103** is put under tension whereby once the operating handle **30** has reached its tripped position and the upstanding tab **128** thereof is no longer in engagement with the actuating surface under it (this instant in time being shown in phantom at **100'** in FIGURE 4), the member **92** will be rotated clockwise back to the initial position it occupied in FIGURE 2.

To convert the breaker from the "tripped" condition shown in FIGURE 4 back to the "on" position shown in FIGURE 2, the operator merely grasps the knob **118** and rotates it (and the operating handle **30**) from its position in abutment with the wall projection **120** to its other extreme position defined by the wall projection **122**. In so doing, the upstanding projection **128** on the operating handle **30** engages the actuating surface **100** of member **92** once again such that the member **92** rotates clockwise in FIGURE 4 and second member **94** with the actuating surface **104** are moved toward the left in FIGURE 4, the movement of the actuating surface **104** being guided by the elongated slot **24** into contact with the cradle **44**.

As this motion continues, the upstanding actuating surface **104** causes the cradle **44** to be rotated counterclockwise in FIGURE 4 until the latch tip **54** passes beneath the latch **56** (which has been urged counterclockwise in FIGURE 4 by the biasing spring **103**) at which time the cradle **44** will occupy the latched position shown in FIGURE 3.

Finally, when the operating handle **30** passes over center point **64**, the operating spring **72** will snap the movable contact arm **62** counterclockwise in FIGURE 4 until it reaches the "on" position shown in FIGURE 2. Thus the circuit breaker has been converted from trip to "on" position with one continuous motion of the operating handle **30**.

It should be noted that once the upstanding tab **128** of operating handle **30** is free of the actuating surface designated at **100** in FIGURE 4, the biasing spring **103** will again return the member **92** to the position shown in solid lines in FIGURE 4 (corresponding to FIGURE 2), whereby the automatic relatching mechanism will be in condition to function properly for either the next tripping operation or manual movement from the "on" to "off" positions.

There has thus been described a circuit breaker having a mechanism mounting plate assembly which is separate from the breaker casing. This eases the assembly of circuit breaker components, permits breaker casings to be molded more easily, provides a more durable mounting for movable circuit breaker components and permits circuit breakers to be made thinner.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited, not by the specific disclosure herein, but only by the appending claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. In a circuit breaker comprising,

a casing for containing circuit breaker components, said components including:

a pair of cooperating contacts;

a circuit interruption mechanism for causing separation of said cooperating contacts;

a circuit reclosing mechanism for bringing said cooperating contacts into engagement;

the improvement comprising, a mounting plate assembly for directly and indirectly mounting and positioning various of said circuit breaker components;

said mounting plate assembly comprising a plate which is separable from and mounted within said casing; said plate having means for directly and indirectly mounting and positioning said components; said components being mounted to said plate;

said plate being substantially in a plane and also being thin and flat as compared to said casing, whereby the circuit breaker will have a thin width.

2. In the circuit breaker of claim **1**, the improvement further comprising said means for mounting and positioning circuit breaker components comprising apertures through said plate and tabs connected to and upraised from said plate;

said components which are directly mounted to said plate having apertures and upraised tabs for cooperation, respectively, with said tabs on and apertures through said plate, whereby said components can be mounted to said plate.

3. In the circuit breaker of claim **2**, the improvement further comprising

said tabs being integral with said plate.

4. In the circuit breaker of claim **3**, the improvement further comprising,

said plate being comprised of metal.

5. In the circuit breaker of claim **2**, the improvement further comprising,

said components being thin and substantially flat as compared to said casing, whereby the circuit breaker will have a thin width.

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