

June 17, 1952

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2,601,147

CIRCUIT BREAKER

Filed Oct. 16, 1944

4 Sheets-Sheet 1

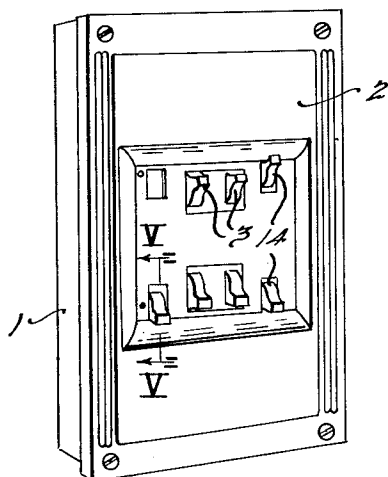


FIG. 1.

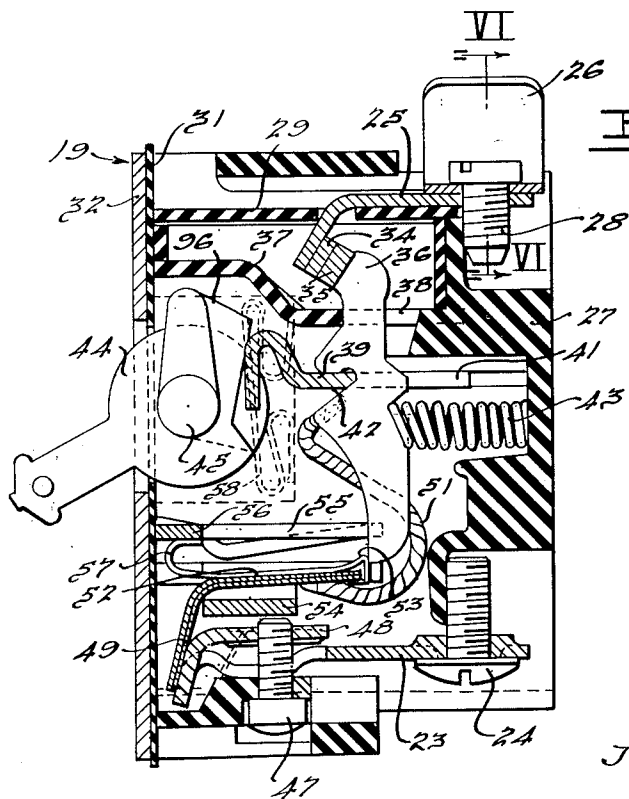


FIG. 5.

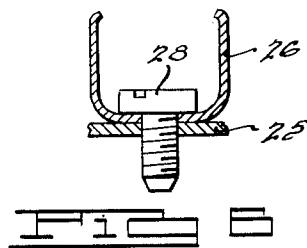


FIG. 6.

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4 Sheets-Sheet 2

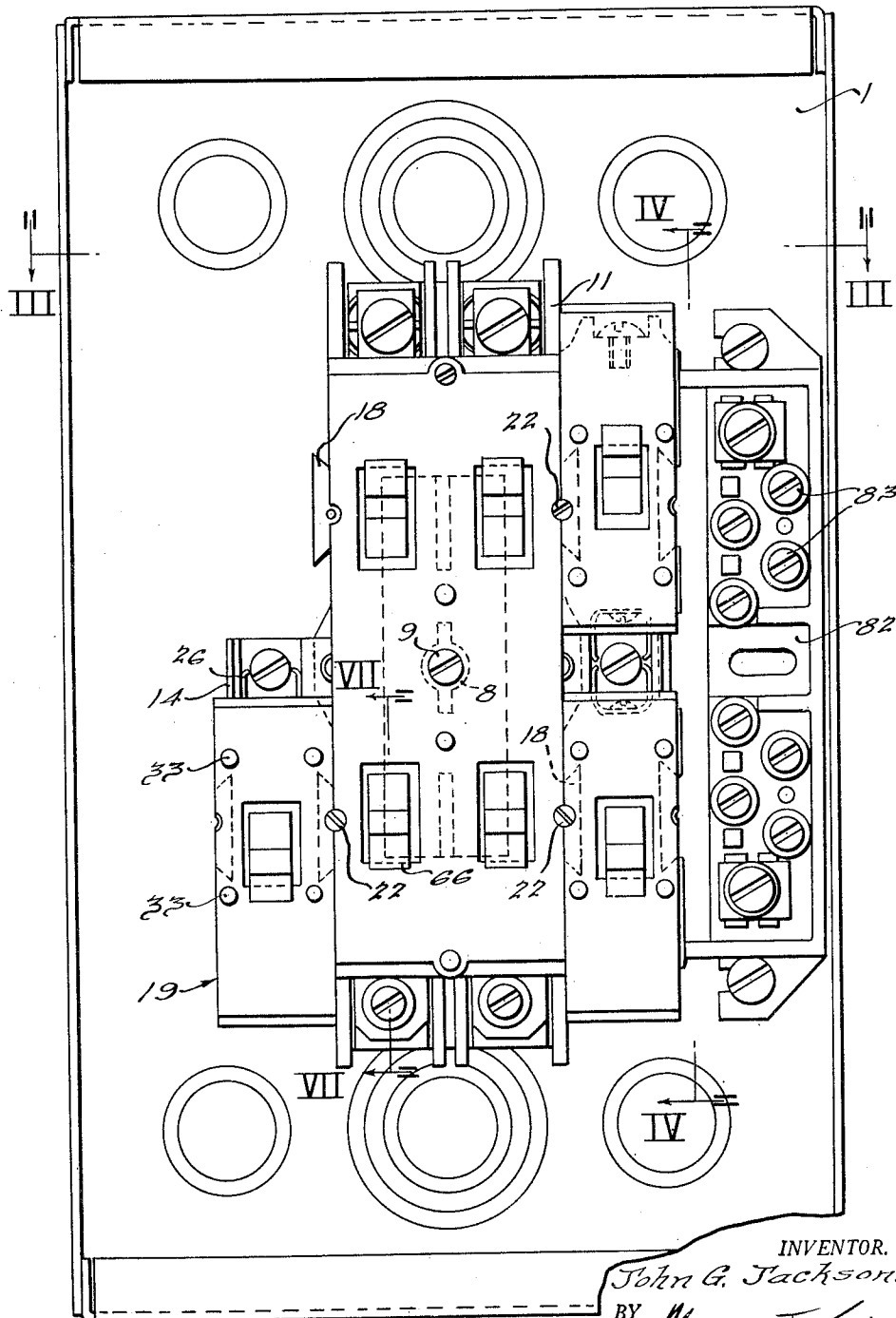


FIG. 2.

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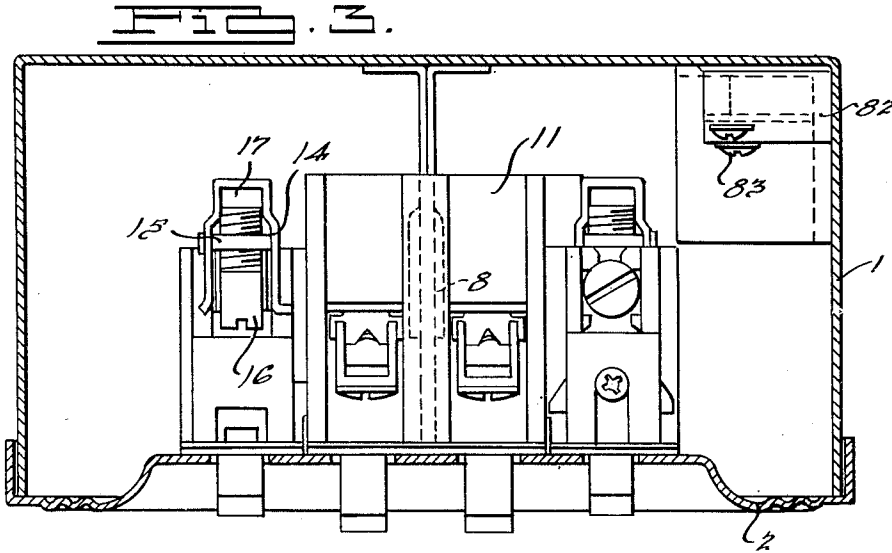
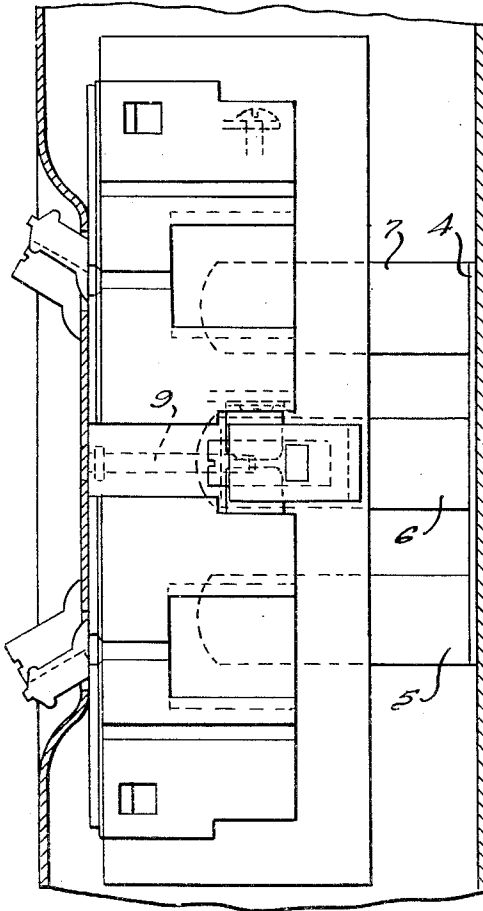
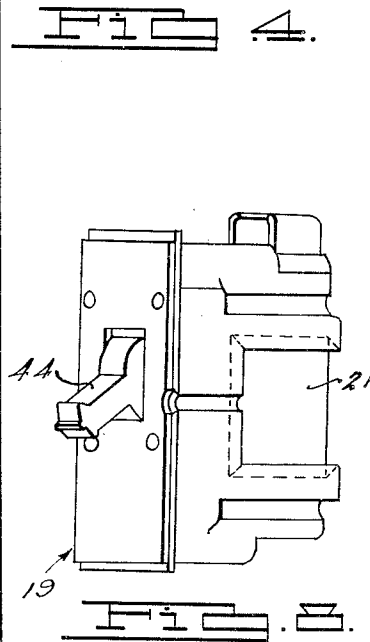
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4 Sheets-Sheet 3



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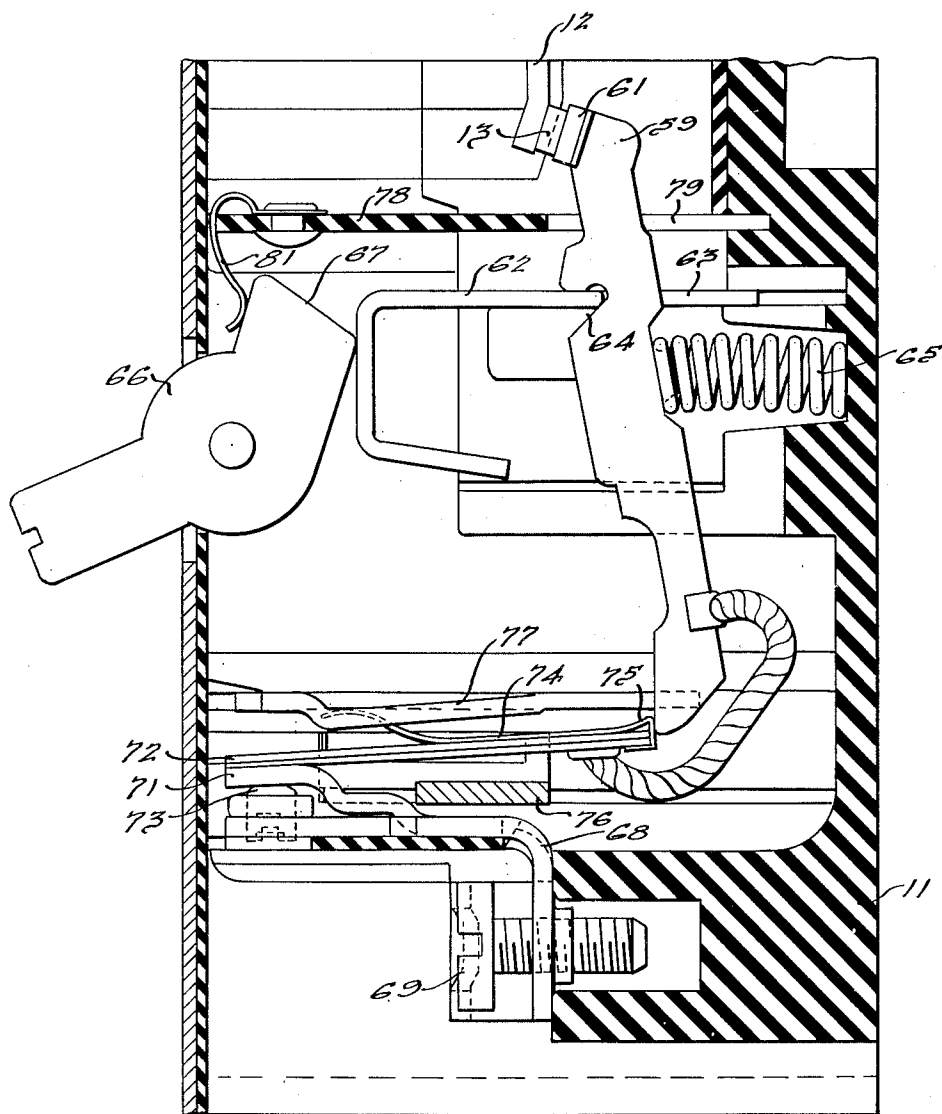
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CIRCUIT BREAKER

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2,601,147

CIRCUIT BREAKER

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Application October 16, 1944, Serial No. 558,822

8 Claims. (Cl. 175-308)

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This invention relates to electric circuit breaker mountings and more particularly to a circuit breaker mounting providing for the ready addition of supplemental circuit breakers and circuits, as desired, in an existing assemblage.

In the use of automatic electric circuit breakers for circuit wiring protection, it often happens that after an installation is made it is desired to provide for additional circuits and protection therefor. If an attempt is made to anticipate this future need in the initial installation, it involves expenditures which are always greater than those initially needed and which may never be needed. On the other hand, it is undesirable to add to the installation with an additional enclosure and separate breaker mounting with its attendant increased cost and difficulty of installation.

The object of the present invention is to provide an electric circuit breaker in which the number of circuit breakers and branch circuits may be selected according to the need at the time of installation and in which provision is made for easy addition of supplemental circuit breakers and branch circuits as future needs unfold.

In connection with the foregoing general object, it is a further specific object of the invention to provide for the ready interlocking of the supplemental circuit breakers with the existing circuit breaker mounting together with a clip electrical connection facilitating the circuit breaker additions.

Other objects and features of the invention will be readily apparent to those skilled in the art from the specification and appended drawings illustrating certain preferred embodiments in which:

Figure 1 is a front elevational view of the enclosed circuit breaker device according to the present invention.

Figure 2 is a front elevational view of the device of Figure 1 with the cover removed.

Figure 3 is a sectional view on the line III—III of Figure 2.

Figure 4 is a sectional view on the line IV—IV of Figure 2.

Figure 5 is a sectional view through one of the supplemental circuit breaker devices on the general line V—V of Figure 1.

Figure 6 is a detailed sectional view on the line VI—VI of Figure 5 showing the electrical clip connection.

Figure 7 is a sectional view through one of the breaker elements of the initial breaker device on the general line VII—VII of Figure 2.

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Figure 8 is a partial perspective view of a supplemental breaker mounting.

The circuit breaker assemblage, as specifically illustrated in the drawing, comprises an outer enclosing box 1 having an openable cover 2 through which project the operating handles 3 of the individual circuit breaker mechanism. Upon the back wall of the box 1 is mounted a bracket 4 having frontwardly projecting legs 5, 6 and 7 received within slots in the base of the main circuit breaker element to support and guide the same. The leg 6 is provided with a circular threaded portion 8 more particularly shown in Figures 2 and 3 in which is threaded an adjusting screw 9 for holding the main circuit breaker element in its adjusted position within the box and relative to the front cover.

The main circuit breaker element comprises an insulating base 11 within which are disposed four individual electric circuit breaker mechanisms with the vertically aligned mechanisms of common polarity and utilizing common contact plates 12 on which are disposed stationary contact 13, the plates 12 being disposed adjacent the mid portion of the breaker unit and extending through the opposite sides thereof as straps 14 which are return bent into U form as shown in Figure 3 to form terminal connectors. The opposite legs of the U-shaped connectors 14 are connected by plates 15 in which are threaded the studs 16. The space 17 between the bight of the U-shaped connector and the bottom of the stud 16 serves for the attachment of line conductors which are clamped in position by the tightening of the stud. The opposite side walls of the U-shaped connector forwardly of the plate 15 serve for the reception of the line clips on the supplemental breaker units, as will be hereinafter explained.

The opposite side walls of the base 11 are provided with dovetails 18 and the opposite side walls of the supplemental breaker units 19 are provided with complementary dovetail slots 21 which receive the same to mount the supplemental units in either right or left hand relation. Studs 22 are provided which extend through half slots in the side walls of the main base 11 and of the supplementary unit 19 and which thread into the dovetails 18 and serve to prevent accidental removal of the supplemental units once they have been installed. The supplemental units have, at one end, branch terminal connectors 23 carrying wire attaching means 24 and at their opposite ends have line terminal connectors 25 carrying clips 26. When the sup-

plemental units are mounted upon the sides of the main initial breaker device by engagement of the dovetail slots in the units with the dovetails on the side walls of the main initial units, the insertion of the supplementary units 19 into their attached position will place the clips 26 within the U-shaped connector 14 with the opposite arms of the clip engaging the interior opposed surfaces of the legs of the connector as shown in Figures 2 and 3. When so mounted, the supplemental units are mechanically supported upon the initial breaker unit and have their line terminals electrically connected to the line terminals of the main unit.

While the particular circuit breaker mechanism utilized in the main and supplementary units forms no part of the present invention, these have been illustrated and will be briefly explained to effect a complete disclosure of an operative device. The supplementary unit, as illustrated in Figure 5, comprises a generally cup-shaped base 27 in which the connectors 23 and 25 are supported into slots in the opposite side walls of the base. The connector 25 is maintained in place through the stud 28 connecting clip 26 to the connector 25 and also by the insulating plate 29 also received in slots in the base and maintained in position by the cover formed by the thin insulating sheet 31 and metallic plate 32, the cover and base being sealed by means of rivets 33. Upon the connector 25 is mounted the stationary contact 34 and cooperating therewith is a movable contact 35 mounted upon a switching blade 36. A formed insulating plate 37 encloses an arc chamber about the cooperating contacts and has a slot 38 through which blade 36 extends. Guided in the opposite side walls of the base is a reciprocable member 39 having a slot 41 in which the blade 35 is disposed and the blade has an upper notch 42 engaging the member 39 as a pivotal support. A compression spring 43 is provided between the back wall of the base and the blade 36 and biases the blade forwardly and for rotation about its pivotal engagement with the rectilinearly movable member 39. An operating handle 44 pivots at 45 in the opposite side walls of the base and has a cam surface 46 engageable with the forward surface of the rectilinearly movable member 39 as the handle is rotated to cause backward movement of the member to effect manual "off" and "reset" operations of the breaker.

The connector 23 is guided in slots in opposite side walls of the base and is maintained in its interior position by terminal stud 24 and an adjusting stud 47. The terminal connector 23 has a pressed out portion 48 at the forward portion of which is mounted a bimetallic element 49 whose free end is electrically connected to the blade 36 by a flexible lead 51. Upon the bimetallic element 49 is mounted a spring element 52 having a latching toe 53 engaged by the latching end of the switching blade 36. A U-shaped magnetic yoke 54 surrounds the bimetallic element 49 and a rotatable armature 55 is provided pivoted in the opposite side walls of the base on trunnions 56 and biased away from the yoke 54 by the end 57 of spring 52. A light spring element indicated at 58 biases the handle 44 to a definite "on" position so that it will indicate on an automatic trip.

The circuit breaker unit in Figure 5 is shown in the contacts engaged position. To manually move the contacts off to the "off" position, the handle 44 is rotated in a clockwise direction

whereupon cam surface 46 will move the rectilinearly movable member 39 toward the back of the base and the contact 35 will be similarly moved with the blade 36 pivoting about its latching engagement with the toe 53. Reverse or counterclockwise movement of the handle will thereafter effect return movement of the contacts to the engaged position under the action of spring 43. Upon current overload, the blade 53 will be unlatched for pivotal movement about its engagement with rectilinearly movable member 39. This may be effected either through flexing of the bimetallic element 49 due to heating or by the movement of the armature 55 or by a combination of these actions. In the bimetallic trip, the element 49 becomes heated and flexes in a clockwise direction, moving the toe 53 out of latching engagement with the blade 36 to permit the aforesaid rotation of the blade in a clockwise direction to disengage the contact 35. In the magnetic action, if the current overload is of sufficient value, the armature 55 will be attracted by the yoke 54 and will move the toe 53 relative to the bimetallic element 49 to effect unlatching of the blade 36 and its consequent rotation to automatic tripped position. To again reset the breaker after an automatic operation, the handle 44 is rotated in a clockwise direction to press the member 39 toward the back of the base whereupon the blade 36 will engage the base adjacent its contact carrying end and will thereafter be rotated in a counterclockwise direction into relatching engagement with the toe 53. Return of the handle thereafter into "on" position will again effect engagement of the contacts.

The structure of the main breaker poles shown in Figure 7 is generally similar in construction and operation to that of the supplementary units of Figure 5. Centrally of the base 11 are mounted the connectors 12 carrying stationary contacts 13, and extending in opposite directions toward the ends of the main original unit are switching blades 59 carrying movable contacts 61 cooperating with the stationary contacts 13. Rectilinearly movable members 62 are guided in the base and have slots 63 receiving the blades 59 and the blades have forward notches 64 providing pivotal engagement with the rectilinearly movable members. Compression springs 65 bias the blades 59 forwardly and for rotation about their engagement with the rectilinearly movable members 62. Handles 66 have cam surfaces 67 for effecting movement of the rectilinearly movable members. Branch terminal connectors 68 are mounted on the base and have wire attaching studs 69 threaded therein. The interior ends of the connectors have pressed out portions 71 upon which are mounted bimetallic elements 72. Adjusting studs 73 are provided for determining the calibration tripping point of the breakers. Upon the bimetallic elements 72 are mounted spring strips 74 having latching toes 75. U-shaped magnetic yokes 76 surround the bimetallic element and pivotal armatures 77 are positioned for attraction thereto. Plates 78 divide the arcing chamber from the breaker mechanisms and have slots 79 through which the blades 59 extend. Light spring elements 81 bias the handle to a definite "on" position. The operation of the breaker unit shown in Figure 7 will be believed to be readily apparent from the description of the operation of the supplemental breaker unit of Figure 5.

Upon the back wall of the box 1 is mounted an insulating block 82 in which are mounted

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terminal screws 23 for the reception of neutral wires.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. In an automatic electric circuit breaker assemblage, a principal circuit breaker unit, a line terminal on said principal circuit breaker unit, means for mounting said principal circuit breaker unit, a supplemental circuit breaker unit directly mechanically mounted and supported on said principal circuit breaker unit, a line terminal on said supplemental circuit breaker unit, and means for interconnecting said line terminals on said principal and supplemental units, said interconnecting means comprising complementary U-shaped terminals on said principal and supplemental circuit breaker units which slidably engage under pressure to effect the electrical connection.

2. In an automatic electric circuit breaker assemblage, a principal breaker unit comprising a plurality of individual breaker mechanisms mounted within a common enclosure, means for mounting said principal unit, line terminals at the opposite sides of said principal unit and adjacent the mid-point thereof, individual supplemental circuit breaker units comprising individual enclosures and circuit breaker mechanisms therein mounted at the sides of said principal unit by slidably interlocking means on the cooperating side walls of said principal unit and supplemental units, and means connecting the line terminals of said supplemental units to the line terminals of the main unit by the act of slidably interlocking the side walls of said main and supplemental units.

3. In an automatic electric circuit breaker assemblage, a principal breaker unit comprising a plurality of individual breaker mechanisms mounted within a common enclosure, means for mounting said principal unit, line terminals at the opposite sides of said principal unit and adjacent the mid-point thereof, individual supplemental circuit breaker units comprising individual enclosures and circuit breaker mechanisms therein mounted at the sides of said principal unit by slidably interlocking means on the cooperating side walls of said principal unit and supplemental units, and means connecting the line terminals of said supplemental units to the line terminals of the principal unit by the act of slidably interlocking the side walls of said main and supplemental units, said connecting means comprising complementary members slidably engaging under tension to effect the electrical connection of the line terminals.

4. In an automatic electric circuit breaker assemblage, a principal breaker unit comprising a plurality of individual breaker mechanisms mounted within a common enclosure, means for mounting said principal unit, line terminals at the opposite sides of said principal unit and adjacent the mid-point thereof, individual supplemental circuit breaker units comprising individual enclosures and circuit breaker mechanisms therein mounted at the sides of said principal unit by slidably interlocking means on the cooperating side walls of said principal and

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supplemental units, means connecting the line terminals of said supplemental units to the line terminals of the principal unit by the act of slidably interlocking the side walls of said principal and supplemental units, and means for locking said supplemental units on said principal unit to prevent sliding removal of the supplemental units until said locking means is released.

5. In an electric circuit breaker assemblage, an enclosing box, a principal circuit breaker unit mounted in said box, supplemental circuit breaker units directly mechanically supported upon said principal circuit breaker unit by slidably interlocking means on the side walls of said principal and supplemental units, line terminals for said principal and supplemental units, and means electrically interconnecting said line terminals, said means comprising conducting connectors slidably engaged by the slidable interlocking of the supplemental units on the principal unit.

6. In an electric circuit breaker assemblage, an enclosing box, a principal circuit breaker unit mounted in said box and comprising an enclosure, a manual and automatic electric circuit breaker mechanism within the enclosure, supplemental circuit breaker units comprising enclosures and manual and automatic electric circuit breaker mechanisms within the enclosures, said supplemental units being directly mechanically supported upon said principal unit by slidably interlocking means integrally formed on the side walls of the enclosures of said principal and supplemental units, and line connectors on said principal and supplemental circuit breaker units interconnecting by engagement as the supplemental units are slidably interlocked with the principal units.

7. In an automatic electric circuit breaker assemblage, a principal circuit breaker unit comprising an enclosure containing at least one manually and automatically operable electric circuit breaker mechanism, means for mounting said principal circuit breaker unit, a line terminal on said principal circuit breaker unit, a supplemental circuit breaker unit directly mechanically mounted on said principal circuit breaker unit, said supplemental circuit breaker unit comprising an enclosure and a manually and automatically operable circuit breaker mechanism therein, a line terminal on said supplemental circuit breaker unit and means for interconnecting the line terminals on said principal and supplemental units, said last mentioned means comprising a pressure clip engagement facilitating the attachment and detaching of said supplemental unit.

8. In an electric circuit breaker assemblage, an enclosing box, a principal circuit breaker unit mounted in said box and comprising an enclosure within which is disposed at least one manually and automatically operable electric circuit breaker mechanism, supplemental circuit breaker units directly mechanically supported upon said principal circuit breaker unit, said supplemental units comprising enclosures and manually and automatically operable electric circuit breaker mechanisms therein, said supplemental units being supported on said principal unit by slidably interlocking means integrally formed on the side walls of the enclosures of said principal and supplemental units, line terminals for said principal and supplemental units, and means electrically interconnecting said line terminals, said last mentioned means slidably engaging as the sup-

plemental units are interlocked with the principal unit.

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