CIRCUIT INTERRUPTER WITH IMPROVED TERMINAL CONNECTING MEANS

Filed July 30, 1964 2 Sheets-Sheet 1

FIG. 1.

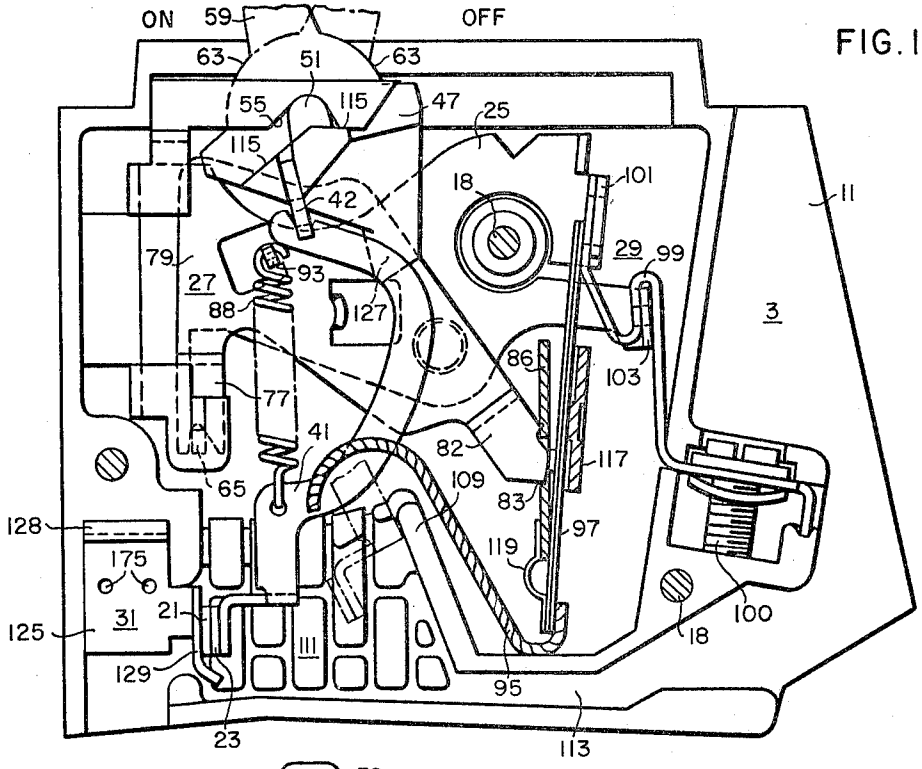
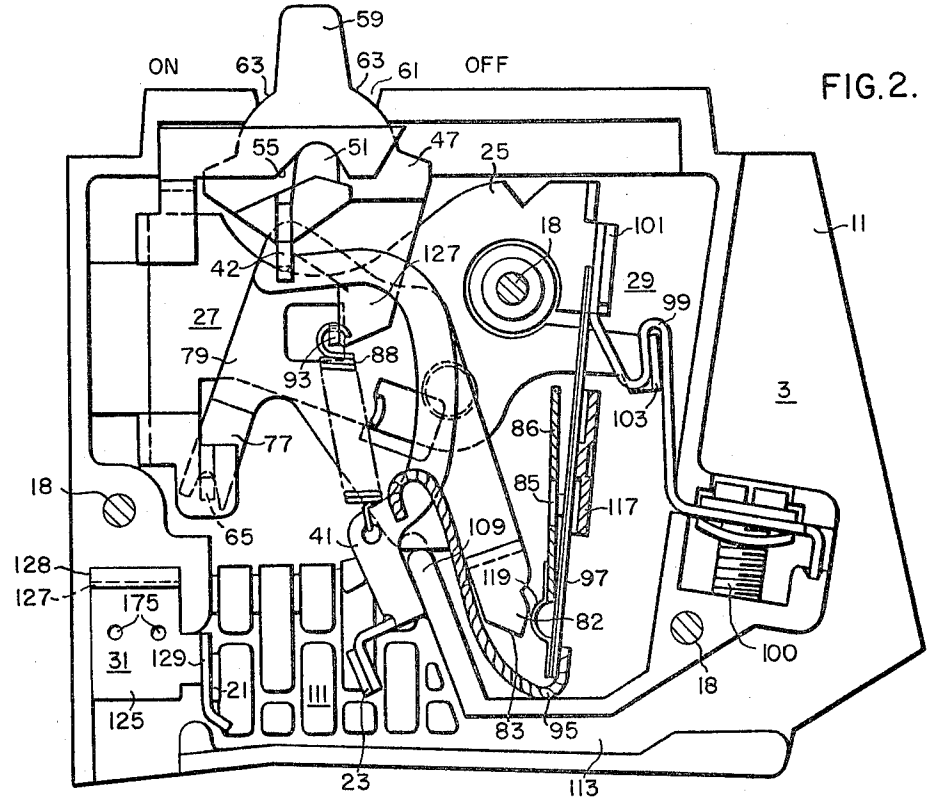


FIG. 2.



Dec. 6, 1966 F. L. GELZHEISER 3,290,474

CIRCUIT INTERRUPTER WITH IMPROVED TERMINAL CONNECTING MEANS

Filed July 30, 1964 2 Sheets-Sheet 2

FIG. 5.

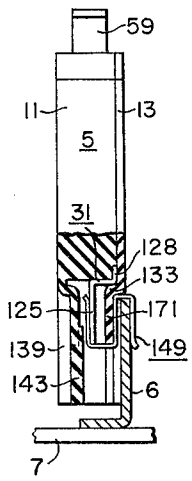


FIG. 7.

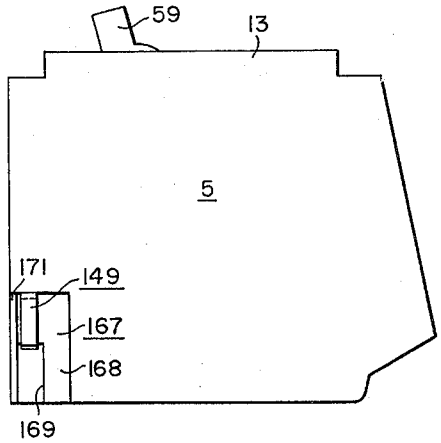


FIG. 6.

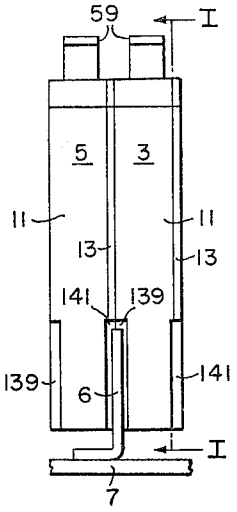
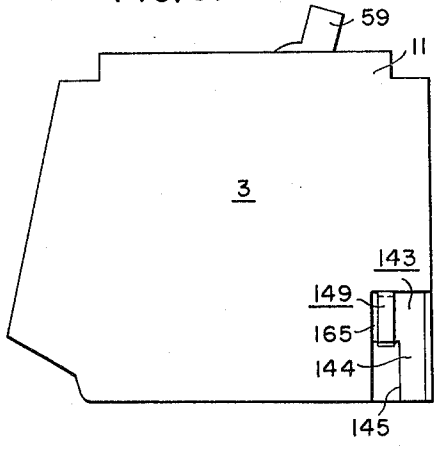
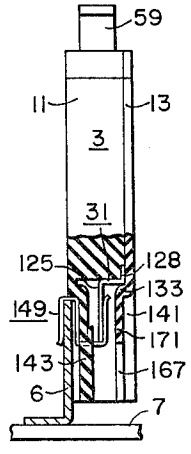


FIG. 3.

FIG. 8.





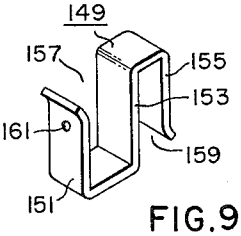


FIG. 9.

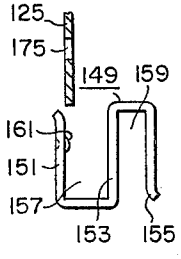


FIG. 11.

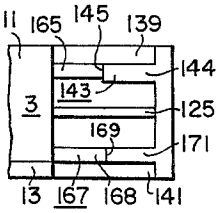


FIG. 12.

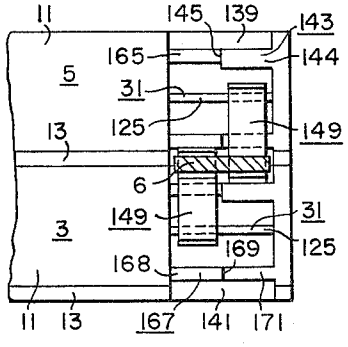


FIG. 4.

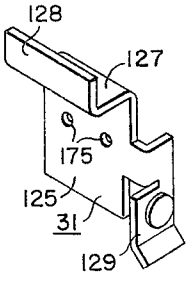


FIG. 10.

United States Patent Office

3,290,474

Patented Dec. 6, 1966

3,290,474

CIRCUIT INTERRUPTER WITH IMPROVED TERMINAL CONNECTING MEANS

Francis L. Gelzheiser, Fairfield, Conn., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Filed July 30, 1964, Ser. No. 386,234
13 Claims. (Cl. 200—168)

This invention generally relates to circuit interrupters and more particularly to circuit breakers of the type constructed to be plugged onto a stab conductor.

Many prior art circuit breakers are constructed as double-type circuit breakers of the type comprising a single housing having two compartments enclosing two separate circuit-breaker mechanisms. In these circuit breakers, two separate line terminals, one for each of the two mechanisms, are generally provided to cooperate to form a clip-on type terminal structure that can be clipped onto a common stab conductor to support the line end of the double-type circuit breaker and to electrically connect the two circuit breaker mechanisms to the stab conductor.

An object of this invention is to advance the art by providing an improved circuit breaker that can be mounted on a common stab in a side-by-side relationship with a similar circuit breaker whereby two separate circuit breakers can be utilized where formerly a unitary double-type circuit breaker was utilized. Thus, if there is a mechanical or electrical failure of one of the circuit breakers, only the one defective breaker need be replaced. Moreover, increased versatility is achieved since the two separate and independent circuit breakers can be mounted together in a variety of rating combinations.

Another object of this invention is to provide an improved combination comprising a conducting stab and two novel circuit breakers connected to the conducting stab.

A further object of this invention is to provide an improved circuit breaker with a first and a second opening means at the back line end thereof and a connector that can be removably mounted in either of said opening means to connect the circuit breaker to a conducting stab.

A more general object of this invention is to provide a novel circuit breaker having increased utility.

The novel features that are considered characteristic of this invention are set forth in particular in the appended claims. The invention, both as to structure and operation, together with additional objects and advantages thereof, will be best understood from the following detailed description when read in conjunction with the accompanying drawings, in which:

FIGURE 1 is a sectional view taken generally along the line III—III of FIG. 3;

FIG. 2 is a view similar to FIG. 1; except that the parts are shown in the tripped position;

FIG. 3 is an end view, on a smaller scale relative to FIGS. 1 and 2, of two circuit breakers that are mounted to a common conducting stab;

FIG. 4 is a bottom partial view with the conducting stab being shown in section and illustrating the mounting arrangement of the two circuit breakers seen in FIG. 3;

FIGS. 5 and 6 are end views, with parts broken away, of the circuit breakers seen in FIG. 3;

FIGS. 7 and 8 are side elevational views of the circuit breakers seen in FIGS. 5 and 6 respectively;

FIG. 9 is a perspective view of one of the conducting connectors seen in FIGS. 4–8;

FIG. 10 is a perspective view of one of the line terminal structures seen in FIGS. 1–4;

FIG. 11 is an end view of the conducting connector seen in FIG. 9 and a partial sectional view of the conducting terminal structure seen in FIGS. 1 and 2; and

FIG. 12 is a bottom view illustrating the line end of one of the circuit breakers seen in FIG. 4.

The general operation and certain parts of the circuit breaker mechanism disclosed herein are described more specifically in the copending patent application of Earl Bullis, Jr., Serial No. 182,765, filed March 27, 1962, now Patent No. 3,200,217.

Referring to FIG. 3 of the drawings, two circuit breakers 3 and 5 are shown therein mounted on a generally rigid conducting stab 6 that is secured to and supported on a generally rigid bus bar 7. The circuit breakers 3 and 5 are of identical construction and, therefore, only the circuit breaker 3 will be herein specifically described, it being understood that the description applies to both of the circuit breakers.

Referring to FIGS. 1–3, the circuit breaker 3 comprises an insulating housing that is composed of two molded insulating parts 11 and 13 (FIG. 3). The part 11 comprises one side integral with four side wall portions forming an opening which is covered by the cover 13. The molded insulating parts 11 and 13 are held rigidly together by three rivets 18 (FIGS. 1 and 2).

Referring to FIGS. 1 and 2, a circuit breaker mechanism, which is enclosed by the housing 11, 13, comprises a stationary contact 21, a movable contact 23, a supporting metal frame 25, an operating mechanism 27 and a trip device 29.

The stationary contact 21 is welded, or otherwise rigidly secured, to a line terminal conductor 31 that will be hereinafter more specifically described. The movable contact 23 is welded or otherwise rigidly secured to a generally C-shaped contact arm or switch arm 41. A bearing member 42 is provided with a slot that is complementary with a slot in the upper part of the contact arm 41 and the bearing is provided with two upper leg portions that fit into suitable slots in a molded insulating operating member 47. The bearing 42 transmits motion from the operating member 47 to the movable contact arm 41 when the breaker is manually operated, and, as will be hereinafter explained, from the movable contact arm 41 to the operating member 47 when the breaker is tripped automatically in response to an overload current condition.

The operating member 47 is a molded insulating member having an arcuate trunnion 51 molded at each side thereof. The trunnions 51 fit and rotatably ride on two arcuate surfaces 55 that are formed on the metallic supporting frame 25. The operating member 47 is supported between the surfaces 55 of the frame 25 and the bearing 42 which is supported by the contact arm 41. The operating member 47 has a handle part 59 molded integrally therewith, which handle part extends through an opening 61, FIG. 2, in the insulating housing to permit manual operation of the circuit breaker. Arcuate surfaces 63 on opposite sides of the handle 59 substantially close the opening 61 in all positions of the operating member 47.

The frame 25 supports an insulating pivot 65. A metallic trip member 79 is pivotally supported at one end 77 thereof on the pivot 65. The other end 82 of the trip member 79 has a latch surface 83 that rests (FIG. 1) on a ledge 85 (FIG. 2) on an armature 86 to support the trip member in the latched position seen in FIG. 1. The armature 86 is part of the trip device 29 which will be hereinafter specifically described. The ends 77 and 82 of the trip member 79 are offset and disposed in a plane that is parallel to the plane in which the main body portion of the trip member 79 is disposed. An overcenter spring 88 (FIGS. 1 and 2) is connected, under tension, at one end in an opening in the contact arm 41 and at the other end in a slot in a projection 93 that extends from the trip member 79.

The movable contact arm **41** is connected by means of a flexible conductor **95** to the free end of a bimetal **97** that is attached at its other end to a load terminal conductor **99**. A load terminal connecting screw **100**, which is externally accessible, is provided at the outer end of the conductor **99** to enable connection of the circuit breaker in an electric circuit. The load terminal conductor **99** is welded, or otherwise suitably attached, to a projection **101** that extends out from the supporting frame **25**. The terminal conductor **99** is given additional support by being looped over and welded to another projection **103** that extends out from the supporting frame **25**. Thus, the load terminal conductor is rigidly held in place within the housing part **11**.

The closed circuit through the circuit breaker mechanism extends from the line terminal conductor **31** (FIG. 1) through the stationary and movable contacts **21**, **23**, the contact arm **41**, the flexible conductor **95**, the bimetal member **97**, the load terminal conductor **99**, to a conducting wire that would be electrically connected to the conductor **99** by means of the screw **100** when the circuit breaker is in operating position. Since the movable contact arm **41** extends downward from its pivot, the arc is established adjacent the bottom or back of the housing in an arc chute **111**, one end of which is connected by a vent passage **113** to an opening in the load end of the housing beneath the load terminal screw **100**.

The circuit breaker is manually operated to open and close the contacts **21**, **23** by operation of the insulating handle **59** that extends through the opening **61** in the front of the housing **11**, **13**. Movement of the handle **59** clockwise from the full-line "on" position (FIG. 1) to the "off" position in which it is shown in dot-and-dash lines, carries the upper end of the contact arm **41** to the left of the line of action of the spring **88** whereupon the spring operates to move the contact arm **41**, to the open position shown partially in dot-and-dash lines in FIG. 1. A projection **109**, molded integral with the housing part **11**, acts as a stop to limit opening movement of the contact arm **41**. Movement of the handle **59** in a counterclockwise direction from the "off" to the "on" position moves the upper end of the movable contact arm **41** to the right of the line of action of the spring **88** whereupon the spring operates to move the contact arm to the closed position seen in FIG. 1. Movement of the handle **59** in both directions is limited by the operating member surfaces **115** (FIG. 1) which engage the frame **25** on opposite sides of the pivot **51**.

The trip device **29** is provided to effect automatic opening of the circuit breaker upon the occurrence of overload current conditions. The trip device **29** comprises the magnetic armature **86**, the bimetal **97**, a U-shaped magnetic member **117** that is secured to the bimetal **97** with the free ends thereof facing in the direction of the magnetic armature **86**, and a spring **119**. The upper end of the bimetal **97** is welded or otherwise suitably secured to the terminal conductor **99** that is secured to the projection **101** on the metal frame **25**. The flexible conductor **95** is welded or otherwise suitably secured to the lower or free end of the bimetal **97**, and it electrically connects the bimetal **97** with the movable contact arm **41**. The armature **86** is movably mounted on the bimetal **97** by means of the spring **119** that is secured at the lower end thereof to the bimetal **97** and at the upper end thereof to the armature **86**.

Upon the occurrence of an overload current below a predetermined value, the bimetal element **97** is heated, and when it is heated a predetermined amount, it deflects, with a time delay, to the right as seen in FIG. 1 to effect a thermal tripping operation. The armature **86**, which is supported on the bimetal **97** by means of the spring **119**, is carried to the right with the bimetal to release the trip member **79**. When the trip member **79** is released, the spring **88** acts to rotate the trip member clockwise about the pivot **65** to the tripped position seen in FIG. 2. During this movement, the line of action of the spring **88** moves to the right of the pivot **42** of the contact arm **41** whereupon the spring biases the contact arm in an opening direction and moves the contact arm so that the line of action of the force exerted by the spring on the operating member **47** shifts across the pivot **51** whereupon the spring **88** actuates both the contact arm **41** and the operating member **47** to the tripped position in which these parts are shown in FIG. 2. In order to provide a visual indication that the breaker has been automatically tripped open, movement of the operating member **47** is stopped in an intermediate (FIG. 2) position when a projection **127** that is molded integral with the operating member **47** strikes the spring-supporting projection **93** that extends from the trip members **79**. The circuit breaker is trip-free in that the breaker will trip open upon the occurrence of an overload tripping current even if the handle **59** is held in the "on" or closed position.

Before the contacts can be closed following an automatic opening operation, it is necessary to reset and relatch the mechanism. This is accomplished by moving the operating handle **59** clockwise from the tripped open position (FIG. 2) to the full "off" position. During this movement, due to the engagement of the projection **127** of the operating member **47** with the projection **93** of the trip member **79**, the trip member is moved counterclockwise about the pivot **65** until the latch point **83** is again supported in the latched position on the ledge **85** of the armature **86**. Thereafter, the circuit breaker can again be manually operated in the same manner as was hereinbefore described.

The circuit breaker is magnetically tripped automatically and instantaneously in response to overload currents above the predetermined value. Upon the flow of current through the bimetal **97**, a magnetic flux, which is induced around the bimetal, takes the path of least reluctance through the magnet **117**, across an air gap and through the armature **86**. When an overload current above the predetermined value occurs, the pull of the magnetic flux is of such strength that the armature **86** is attracted to the magnet **117** whereupon the spring **119** flexes permitting the armature to move to the right relative to the bimetal **97**. This movement releases the trip member **79** to effect opening of the contacts in the same manner hereinbefore described with respect to the thermal tripping operation.

Improved means is provided for mounting the circuit breaker on a panelboard conducting stab. As can be seen in FIG. 10, the line terminal structure **31** comprises a sheet metal type conducting member formed with a generally planar connecting part **125** and a generally planar supporting part **127** that is bent over and disposed generally in a plane normal to the plane of the connecting part **125**. The supporting part **127** is bent over to form a planar extension **128** that is generally normal to the part **127**. The conducting member is also bent over to form a generally planar contact supporting part **129** that is disposed generally in a plane that is normal to the planes of the parts **125**, **127** and **128**. As can be seen in FIGS. 1 and 2, the stationary contact **21** is welded or otherwise suitably secured to the part **129** of the line termnial structure **31**. As can be seen in FIGS. 1, 2, and 6, the line terminal structure **31** is supported between the part **11** and the cover **13** of the circuit breaker housing. The cover **13** has an inturned portion **133** that fits under part of the supporting part **127** of the line terminal structure **31**. The part **128** of the line terminal structure **31** serves as a supporting brace fitting between the housing parts **11** and **13**.

As can be seen in FIGS. 3–8 and 12, each of the circuit breakers **3** and **5** is provided with opening means at the back and line end thereof to enable connection of the circuit breaker to a conducting stab. As can be seen in FIGS. 4 and 12, each of the circuit breakers is provided with a slot portion **139** at one side thereof and a slot portion **141** at the other side thereof each of which slot por-

tions is provided to receive one half of a conducting stab **6** (FIGS. 3–6) when the circuit breaker is mounted in a panelboard. An insulating barrier portion **143** (FIGS. 4–6, 8 and 12) separates the slot or notch portion **139** from the internal part of the opening that receives and supports the connecting part **125** of the line terminal structure **31**. The barrier **143** comprises a lower part **144** (FIG. 8) that stops at an edge **145** to form an opening that is disposed under an upper part **165** of the barrier **143**. The opening is provided to receive a generally S-shaped conducting connector **149**. As is best seen in FIGS. 9 and 11, the S-shape conducting connector **149** comprises three leg portions **151**, **153**, and **155** forming two loops **157** and **159**. The connector **149** is formed from a generally resilient conducting member. A projection **161** is formed in the leg **151** by means of a stamping operation. A barrier **167** (FIGS. 7 and 12) is molded integral with the housing part **11**. The barrier **167** is disposed between the connecting part **125** of the line terminal structure **31** and the notch portion **141**. The barrier **167** comprises a lower part **168** (FIG. 7) that stops at an edge of an opening that is disposed under an upper part **171** of the barrier **167**. The opening is provided to receive the S-shaped conducting connector **149**.

As is seen in FIGS. 4–7 and 12, the barrier portion **168** insulates the conducting connector **149** when the bus bar **6** is disposed in the slot or notch **139**, and the barrier **144** insulates the conducting connector **149** when the bus bar **6** is disposed in the slot or notch **141**. For example, a plurality of pairs of circuit breakers **3**, **5**, with each breaker being ½ inch wide, can be mounted on a plurality of stabs **6** that are spaced in 1 inch centerlines and the barriers **144**, **168** will adequately insulate the conducting connectors **149**, that are connected to different stabs, from each other.

The connecting part **125** of the line terminal structure **31** is provided with two openings **175** (FIGS. 9 and 10) to cooperate with a projection **161** (FIG. 11) on the connector **149**. When the connector is snapped into place, in a manner to be hereinafter more specifically described, the projection **161** will engage in one of the openings **175** to more securely support the connector on the breaker. Thus, when the breaker is removed from a panelboard or load center stab, the connector **149** will be removed with the breaker thereby avoiding a creepage problem that could occur in the panelboard or load center if the connector were left on the stab.

Referring to FIGS. 3–12, when it is desired to mount the circuit breaker on the right (FIG. 6) of the conducting stab **6** so that the stab **6** will be disposed in the notch or opening **139** (FIG. 9), the loop portion **157** (FIGS. 9 and 11) of the connector **149** is placed over the connecting part **125** of the line terminal structure **31** and also over the upper barrier portion **165** (FIG. 8) of the housing part **11**. Th circuit breaker members **125** and **165**, and the legs **151** and **153** of the connector **149** are spaced to flex the legs **151** and **153** slightly apart to provide contact pressure between the leg **151** of the resilient conducting connector **149** and the rigid connecting part **125** of the line terminal structure **31**. The projection **161** will snap into one of the openings **175** to provide an interference type fit between the connector **149** and the connecting part **125** of the line terminal structure **31**.

When it is desired to mount the circuit breaker on the left (FIG. 5) of the stab conductor **6** with the stab conductor **6** being disposed in the notch or opening **141** (FIGS. 4 and 5), the connector **149** is mounted in a different position on the circuit breaker. In this case, the connector **149** is supported with the loop portion **157** thereof disposed over the barrier **171** (FIG. 7) and the connecting part **125** of the line terminal structure **31**. The circuit breaker parts **171** and **125** and the legs **151** and **153** of the connector **149** are spaced as to resiliently flex the legs **151** and **153** of the connector **149** slightly apart to provide contact pressure between the leg **151** of the connector **149** and the connecting part **125** of the line terminal structure **31**. In this case, the projection **161** on the connector leg **151** snaps into the other of the two openings **175** in the connecting part **125** of the line terminal structure **31**.

Referring to FIGS. 3–6, when the circuit breakers **3** and **5** are mounted on the same conducting stab **6**, the notch **141** in the circuit breaker **5** and the notch **139** in the circuit breaker **3** cooperate to form a common pocket to receive the bus bar **6** with each of the openings **141** and **139** forming half of the pocket. Thus, the two circuit breakers **3** and **5** are mounted on the same stab **6** in an abutting side-by-side relationship. The loop portion **159** of each of the connectors **149** (FIGS. 4–6) is resiliently clipped onto the rigid conducting stab **6** to physically support the line end of the associated circuit breaker on the conducting stab **6** and to electrically connect the associated line terminal structure **31** with the conducting stab **6**. As seen in FIG. 4, the two connectors **149** are spaced on the stab **6** in the direction that extends between the line end and the load ends of the circuit breakers. Thus, both of the breakers **3** and **5** are mounted on and connected to the same conducting stab **6**. The opening means in each of the breakers is provided to adequately insulate the connector **149** from a conductor or similar connector that may be mounted next to the associated breaker and connected to a different conducting stab that would be disposed and supported on the bus bar **7**. As can be seen in FIGS. 4–8, the insulating barrier **143** insulates the connector **149** when the stab **6** is disposed in the notch **141** (the circuit breaker **5** in FIG. 4), and the insulating barrier **167** insulates the connector **149** when stab **6** is disposed in the notch **139** (the circuit breaker **3** seen in FIG. 4).

When it is decided to mount one of the circuit breakers on a conducting stab, it is first decided to which side the breaker will be mounted and thereafter the connector **149** is inserted into position on the circuit breaker in the same manner hereinbefore described. Thereafter, the circuit breaker is moved into the mounted position with the loop portion **153** of the connector **149** being disposed over the stab **6** to resiliently engage opposite sides of the stab. When it is desired to remove the circuit breaker, the circuit breaker is lifted from the stab **6** and, because of the engagement of the projection **161** (FIG. 11) in the opening **175** and also because of the frictional engagement between the legs **151**, **153** with the connecting part **125** of the line terminal structure **31** and also with the particular barrier (**165** or **171**) that the member would be connected to, the connector **149** is removed with the circuit breaker. If it is desired to reverse the position of the circuit breaker on the stab **6**, the connector **149** is forcefully pulled out of the mounted position on the circuit breaker and then it is mounted in the other position in the same manner hereinbefore described.

If it is desired to provide additional insulation between adjacent circuit breakers that would be mounted in a close side-by-side relationship on adjacent stabs **6**, the barrier parts **144** and **168** of the barriers **143** and **167** respectively could extend over the complete length of the openings **139** and **141** respectively. In this modification the barriers **143** and **167** could be scored to provide knockout portions at **145** and **169** respectively. Thus, when the circuit breaker is to be mounted on a stab the knockout adjacent the stab can be removed to permit the connector **149** to be connected to the breaker and stab and the knockout at the opposite side of the breaker can be left in place to provide additional insulation.

From the foregoing, it can be understood that there is provided by this invention an improved circuit interrupter with improved means for removably mounting the interrupter, at either of two opposite sides thereof, to a panelboard or load-center conducting stab. The

invention also provides a novel combination comprising a stab, two circuit breakers and two connectors removably connected to the breakers and to the stab to removably mount the breakers in an abutting side-by-side relationship on the stab. The breakers and connectors are so constructed that the relative mounted positions of the breakers on the stab can be reversed with the stab extending into a common pocket that is formed by the breakers when the breakers are in either of two possible mounted positions. The invention can be utilized in many standard panelboards and load-centers. For example, a plurality of pairs of circuit breakers can be mounted on a plurality of panelboard or load-center stabs with the stabs being spaced on 1 inch centerlines and with each pair comprising two ½ inch wide circuit breakers mounted in an abutting side-by-side relationship on a common stab. Thus, the separate ½ inch wide circuit breakers can be utilized in a panelboard or load-center that formerly accommodated 1 inch wide double-type circuit breakers.

While the invention has been disclosed in accordance with the provisions of the patent statutes, it is to be understood that various changes in the structural details and arrangements of parts may be made without departing from some of the essential features of the invention. It is desired, therefore, that the language of the appended claims be given as reasonably broad an interpretation as is permitted by the prior art.

I claim as my invention:

1. In combination:
(a) a conducting stab member;
(b) two circuit breakers connected to said stab member;
(c) each of said circuit breakers comprising; an insulating housing, a circuit-breaker mechanism supported within said housing, said mechanism comprising a pair of cooperable contacts and means operable to open and close said contacts;
(d) a separate conducting connector for each of said circuit breakers;
(e) means removably connecting each of said connectors to the associated circuit breaker and to said stab member;
(f) and each of said connectors electrically connecting the associated contacts with said stab member.

2. In combination:
(a) a conducting stab member;
(b) two circuit breakers connected to said stab member;
(c) each of said circuit breakers comprising: an insulating housing, a circuit breaker mechanism supported within said housing, said mechanism comprising a pair of cooperable contacts and means operable to open and close said contacts;
(d) a separate conducting connector for each of said circuit breakers;
(e) means removably connecting each of said connectors to the associated circuit breaker in proximity to a first end of the associated circuit breaker;
(f) means connecting each of said separate connectors to said stab member;
(g) and each of said connectors electrically connecting the associated contacts with said stab member and physically supporting the first end of the associated circuit breaker on said stab member.

3. In combination:
(a) two circuit breakers;
(b) each of said circuit breakers comprising: an insulating housing, a circuit breaker mechanism supported within said housing and comprising a pair of cooperable contacts, said housing comprising a back and a front disposed opposite said back, said front having an opening therein, an operating handle extending from said opening and being movable to open and close said contacts, said housing comprising a line end and a load end;
(c) a conducting stab;
(d) said two circuit breakers being connected in a side-by-side relationship to said stab with each of said housings having an opening in the back and at the line end thereof at the side of the housing that faces the adjacent breaker whereby a common pocket is formed by said openings of said two housings to receive said stab;
(e) said stab extending into said common pocket;
(f) a separate connector connecting each of said circuit breakers to said stab to electrically connect the associated contacts with said stab;
(g) said separate connectors being positioned such that the centerlines thereof are spaced in a direction that extends between said line ends and said load ends.

4. In combination:
(a) two circuit breakers;
(b) each of said circuit breakers comprising: an insulating housing and a circuit breaker mechanism supported within said housing, said circuit breaker mechanism comprising a pair of cooperable contacts, a line terminal conductor supported in said housing in electrical series with said contacts, said housing comprising a back and a front disposed opposite said back, said front having an opening therein, an operating handle extending from said opening and being movable to open and close said contacts, said circuit breaker comprising a line end and a load end, said line terminal conductor being supported in proximity to the back and line end of said housing;
(c) a conducting stab member;
(d) said two circuit breakers being connected in a substantially abutting side-by-side relationship to said stab with each of said housings having an opening in the back and the line end thereof at the side thereof that faces the adjacent breaker whereby a common pocket is formed by said openings of said two housings to receive said stab;
(e) said stab extending into said common pocket;
(f) a separate connector for each of said circuit breakers, each of said separate connectors being removably connected to the associated line terminal conductor;
(g) and each of said connectors being connected to said stab to electrically connect the associated line terminal conductor with said stab.

5. In combination:
(a) two circuit breakers;
(b) each of said circuit breakers comprising: an insulating housing, a circuit-breaker mechanism supported within said housing, said circuit-breaker mechanism comprising a pair of contacts, said housing comprising a back and a front disposed opposite said back, said front having an opening therein, an operating handle extending from said opening and movable to open and close said contacts, said housing comprising a line end and a load end, a line terminal conductor supported in said housing in proximity to the line end and the back of said housing, said housing having opening means therein in proximity to said line terminal conductor;
(c) a conducting stab member;
(d) said two circuit breakers being connected in a side-by-side relationship to said stab with each of said housings having opening means in the back and at the line end thereof to permit said connection;
(e) a separate resilient conducting connector in removable clip-on engagement with each of said line terminals, each of said connectors being in removable clip-on engagement with said stab;
(f) said connectors being spaced from each other in a direciton extending generally between said line ends and said load ends.

6. In combination:
(a) two circuit breakers;
(b) each of said circuit breakers comprising: an insulating housing, a circuit-breaker mechanism supported within said housing, said circuit-breaker mechanism comprising a pair of contacts, said housing comprising a back and a front disposed opposite said back, said front having an opening therein, an operating handle extending from said opening and movable to open and close said contacts, said circuit breaker comprising a line end and a load end, a line terminal conductor supported at said line end and at said back of said circuit breaker, said circuit breaker housing having opening means therein in proximity to said line terminal conductor, a first support barrier on a first side of said line terminal conductor and a second support barrier on a second side of said line terminal conductor which second side is opposite said first side;
(c) a first S-shaped conducting connector connected to a first of said circuit breakers, said first S-shaped conducting connector at a first loop portion thereof resiliently engaging the associated line terminal conductor and the first barrier of said first breaker to be resiliently clipped onto said first circuit breaker in electrical contact with the associated line terminal conductor;
(d) a second S-shaped conducting connector connected to the second of said circuit breakers, said second S-shaped conducting connector at a first loop portion thereof resiliently engaging the associated line terminal conductor and the second barrier of said second circuit breaker to be resiliently clipped onto said second circuit breaker in electrical contact with the associated line terminal conductor;
(e) a conducting stab member;
(f) said two circuit breakers being connected to said stab member with the second loop portion of each of said S-shaped connectors being clipped onto said stab member to electrically connect the associated line terminal conductor with said stab member.

7. In combination:
(a) two circuit breakers;
(b) each of said circuit breakers comprising: an insulating housing, a circuit-breaker mechanism supported within said housing, said circuit-breaker mechanism comprising a pair of cooperable contacts, said housing comprising a back and a front disposed opposite said back, said front having an opening therein, an operating handle extending from said opening and being movable to open and close said contacts, said circuit breaker housing comprising a line end and a load end and having opening means therein in proximity to said line end and in proximity to said back, a line terminal conductor supported in said housing in proximity to said opening means and being electrically connected to said contacts;
(c) a conducting stab;
(d) a separate conducting connector for each of said circuit breakers;
(e) each of said connectors comprising a generally S-shaped member of generally resilient conducting material and comprising a first loop portion and a second loop portion;
(f) said two circuit breakers being connected in a side-by-side relationship to said stab with each of said S-shaped connectors having the first loop portion thereof clipped onto one of said circuit breakers and the second loop portion thereof clipped onto said stab whereby each of said S-shaped connectors electrically connects the associated circuit breaker with said stab, connectors being spaced on said stab in a direction extending generally between the line ends and the load ends of said circuit breakers.

8. In combination:
(a) two circuit breakers;

(b) each of said circuit breakers comprising: an insulating housing, a circuit-breaker mechanism supported within said housing, said circuit-breaker mechanism comprising a pair of contacts, said housing comprising a back and a front disposed opposite said back, said front having an opening therein, an operating handle extending from said opening and being movable to open and close said contacts, said housing comprising a line end and a load end, said housing having opening means therein at the line end and at the back thereof; a line terminal conductor supported in said housing in proximity to said opening means, means electrically connecting said line terminal conductor with said contacts, a first barrier on a first side of said line terminal and a second barrier on the second side of said line terminal which second side is opposite said first side;
(c) a generally rigid conducting stab member;
(d) means connecting said two circuit breakers in a substantially abutting side-by-side relationship to said stab member with the opening means of said two housings forming a common pocket to receive said stab member;
(e) said connecting means comprising two generally S-shaped resilient conducting connectors, each of said generally S-shaped connectors comprising a first loop portion and a second loop portion, a first of said connectors being removably clipped onto a first of said circuit breakers with the first loop portion thereof engaging the associated first barrier and the associated line terminal conductor, the second loop portion of said first connector being removably clipped onto said stab member;
(f) the second of said connectors being removably clipped onto the second of said circuit breakers with the first loop portion thereof engaging the associated second barrier and the associated line terminal conductor, the second loop portion of said second connector being removably clipped onto said stab member;
(g) said connectors being spaced on said stab member in a direction extending between the line ends and the load ends of said circuit breakers;
(h) and means for reversing the relative positions of said circuit breakers and said S-shaped connectors whereby the same breaker and conducting connector can be utilized with the breaker combination regardless of the relative position of the breaker and connector in the breaker combination.

9. A circuit breaker comprising an insulating housing; said insulating housing comprising a back, a front opposite said back, a line end, a load end and two sides; a circuit-breaker mechanism supported within said housing and comprising a pair of cooperable contacts; said front having a handle-opening therein; an operating handle extending from said handle-opening and being operable to open and close said contacts; said housing having a first opening means at the back line and at one side thereof; said housing having a second opening means at the back line end and at the side opposite said one side thereof; a terminal conductor supported in said housing at the back line end thereof in proximity to said first and second opening means; a conducting stab connector supported on said housing at said first opening means, and being removably connected to said terminal conductor in a first position; and said stab connector being removable from said support at said first opening means and being supportable on said housing and connectable with said terminal conductor at said second opening means in a second position advanced from said first position in the direction extending between said ends.

10. A circuit breaker comprising an insulating housing; said inslating housing comprising a back, a front opposite said back, a line end, a load end and two sides; a circuit-breaker mechanism supported within said housing and comprising a pair of cooperable contacts; said front hav-

ing a handle-opening therein; an operating handle extending from said handle-opening and being operable to open and close said contacts; said housing having a first opening means at the back line end and at one side thereof; said housing having a second opening means at the back line end and at the side thereof that is opposite said one side; a terminal conductor supported in said housing in proximity to said first and second opening means; a generally S-shaped clip-on type connector comprising a first loop removably clipped onto said circuit breaker at said first opening means and electrically connected by said clip-on mounting to said termnial conductor; and said connector being removable from said clip-on mounting at said first opening means and being adapted such that said first loop can be clipped onto said circuit breaker at said second opening means and electrically connected by said clip-on mounting to said terminal conductor.

11. A circuit breaker comprising an insulating housing; said insulating housing comprising a back, a front opposite said back, a line end, a load end and two sides; a circuit-breaker mechanism supported within said housing having a handle-opening therein; an operating handle extending from said handle-opening and being operable to open and close said contacts; said housing having opening means at the back line end thereof; a terminal conductor supported in said housing at said opening means; means electrically connecting said terminal conductor with said contacts; said housing comprising a first barrier at said opening means on a first side of said terminal conductor and a second barrier at said opening means on the side of said terminal conductor that is opposite said first side; a generally resilient conducting stab connector removably mounted on said circuit breaker at said opening means in a first mounted position, said connector comprising a loop portion looped over said conducting terminal and said first barrier whereby said connector is supported by means of a clip-on type engagement on said first barrier and said conducting terminal; said connector being removable from said first mounted position and being mountable on said circuit breaker at said opening means in a second mounted position.

12. A circuit breaker comprising an insulating housing; said insulating housing comprising a back, a front opposite said back, a line end, a load end and two sides; a circuit-breaker mechanism supported within said housing and comprising a pair of cooperable contacts; said front having a handle-opening therein, an operating handle extending from said handle-opening and being operable to open and close said contacts; said housing having opening means therein at the back line end thereof; a terminal conductor supported in said housing at said opening means; means electrically connecting said terminal conductor with said contacts; said insulating housing comprising a first barrier having a first barrier opening and being disposed on a first side of said terminal conductor; said insulating housing comprising a second barrier having a second barrier opening and being disposed on the side of said terminal conductor that is opposite said first side; a generally S-shaped connector comprising a first loop portion and a second loop portion; said connector being supported in a first position on said breaker and connected to said terminal conductor such that said connector extends through said first barrier opening with said first loop portion being clipped onto said first barrier and said terminal conductor; said connector being removable from said first position and being supportable in a second position on said breaker in which second position said connector is connected to said terminal conductor such that said connector extends through said second barrier opening with said first loop portion being clipped onto said second barrier and said terminal conductor.

13. A circuit breaker comprising an insulating housing; said insulating housing comprising a back, a front opposite said back, a line end, a load end and two sides; a circuit-breaker mechanism supported within said housing and comprising a pair of cooperable contacts; said front having a handle-opening therein, an operating handle extending from said handle-opening and being operable to open and close said contacts; said housing having opening means therein at the back line end thereof; a terminal conductor supported in said housing at said opening means; means electrically connecting said terminal conductor to said contacts; said insulating housing comprising a first barrier having a first barrier opening and being disposed on a first side of said terminal conductor; said insulating housing comprising a second barrier having a second barrier opening and being disposed on the side of said terminal conductor that is opposite said first side; a resilient generally S-shaped conducting connector comprising a first loop portion and a second loop portion; said connector being supported in a first position on said breaker and connected to said terminal conductor such that said connector extends through said first barrier opening with said first loop portion being clipped onto said first barrier and said terminal conductor; said connector and said breaker being constructed and arranged such that said connector is removable from said first position and supportable in a second position on said breaker in which second position said connector is connected to said terminal conductor such that said connector extends through said second barrier opening with said first loop portion being clipped onto said second barrier and said terminal conductor; and said first and second barriers being spaced from the opposite sides of said housing such that when two of said circuit breakers are disposed in a substantially abutting mutually reversible side-by-side relationship a stab-receiving pocket is formed by the housings of the two circuit breakers between the first barrier of one of the circuit breakers and the second barrier of the adjacent circuit breaker.

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