

Oct. 12, 1965

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3,211,860

CIRCUIT BREAKER WITH IMPROVED TRIP-DEVICE ENCLOSURE

Filed March 2, 1960

6 Sheets-Sheet 1

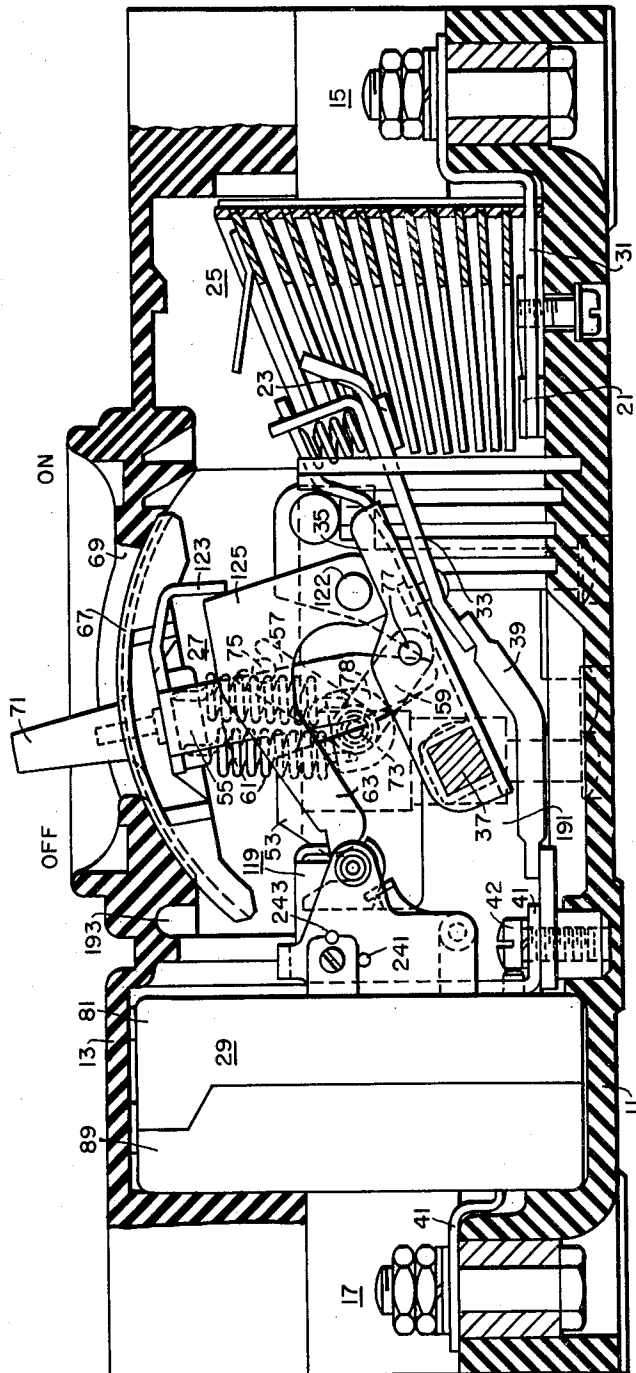


FIG. 1

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Fig. 2.

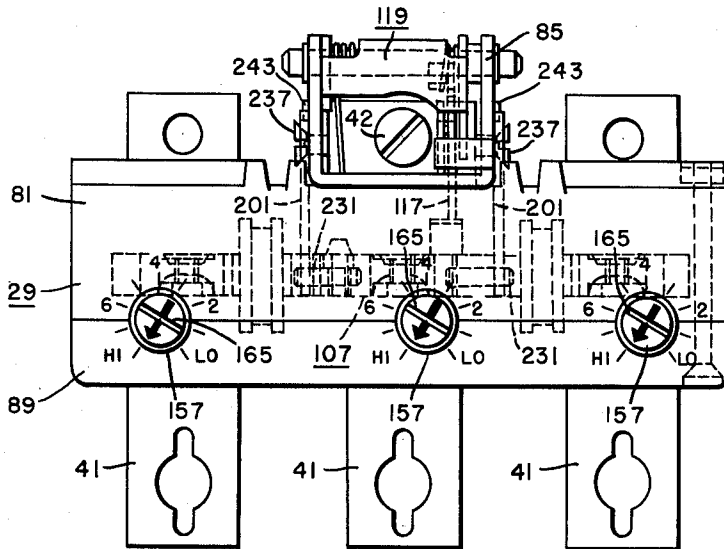
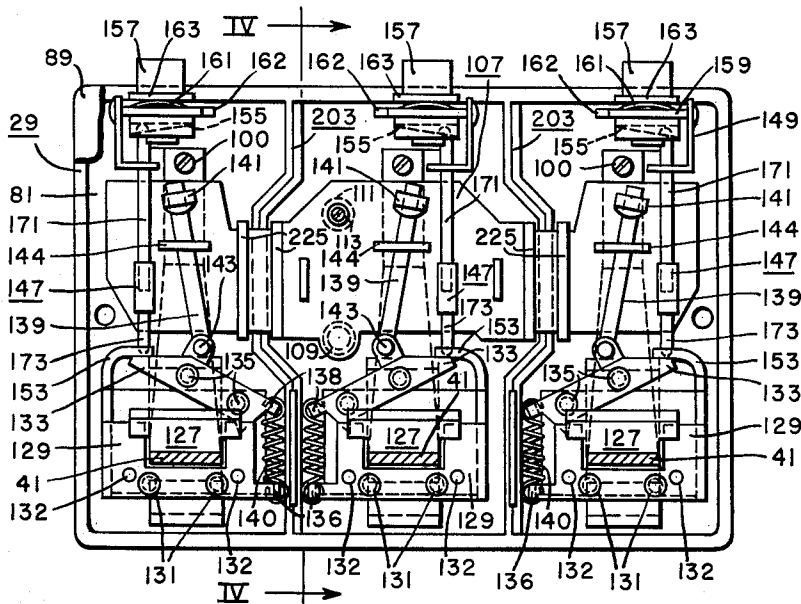


Fig. 3.



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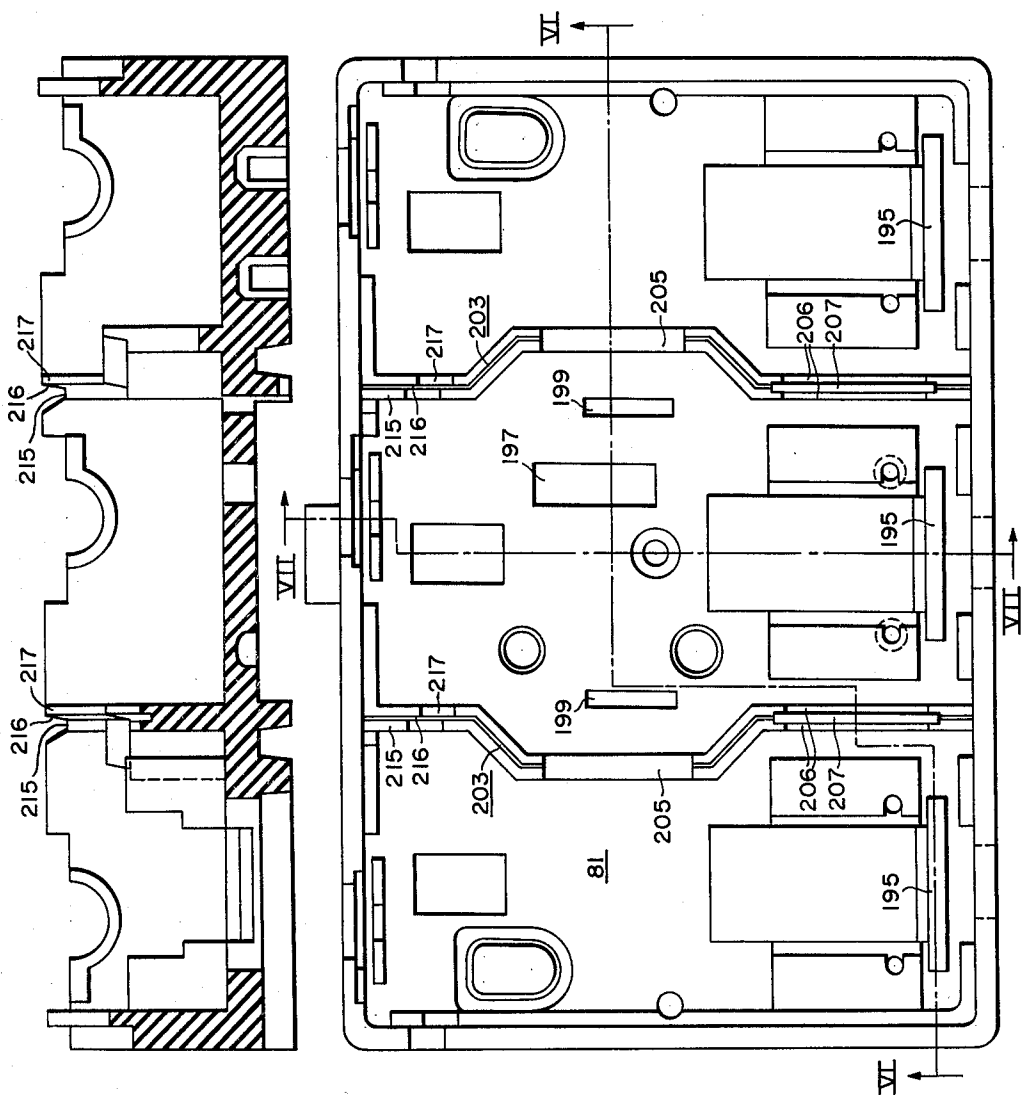


Fig. 5.

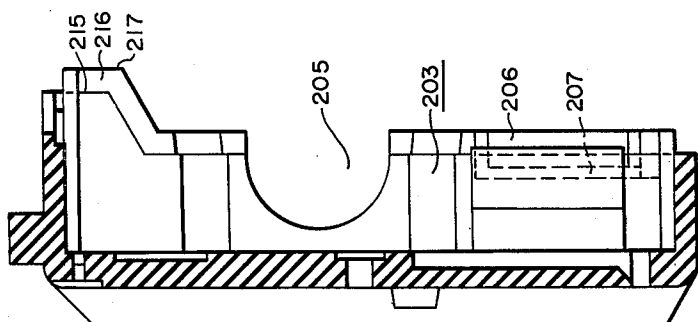
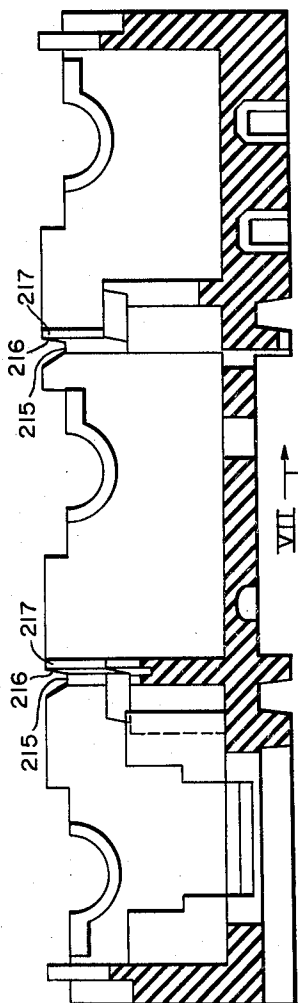


Fig. 6.

Fig. 7.



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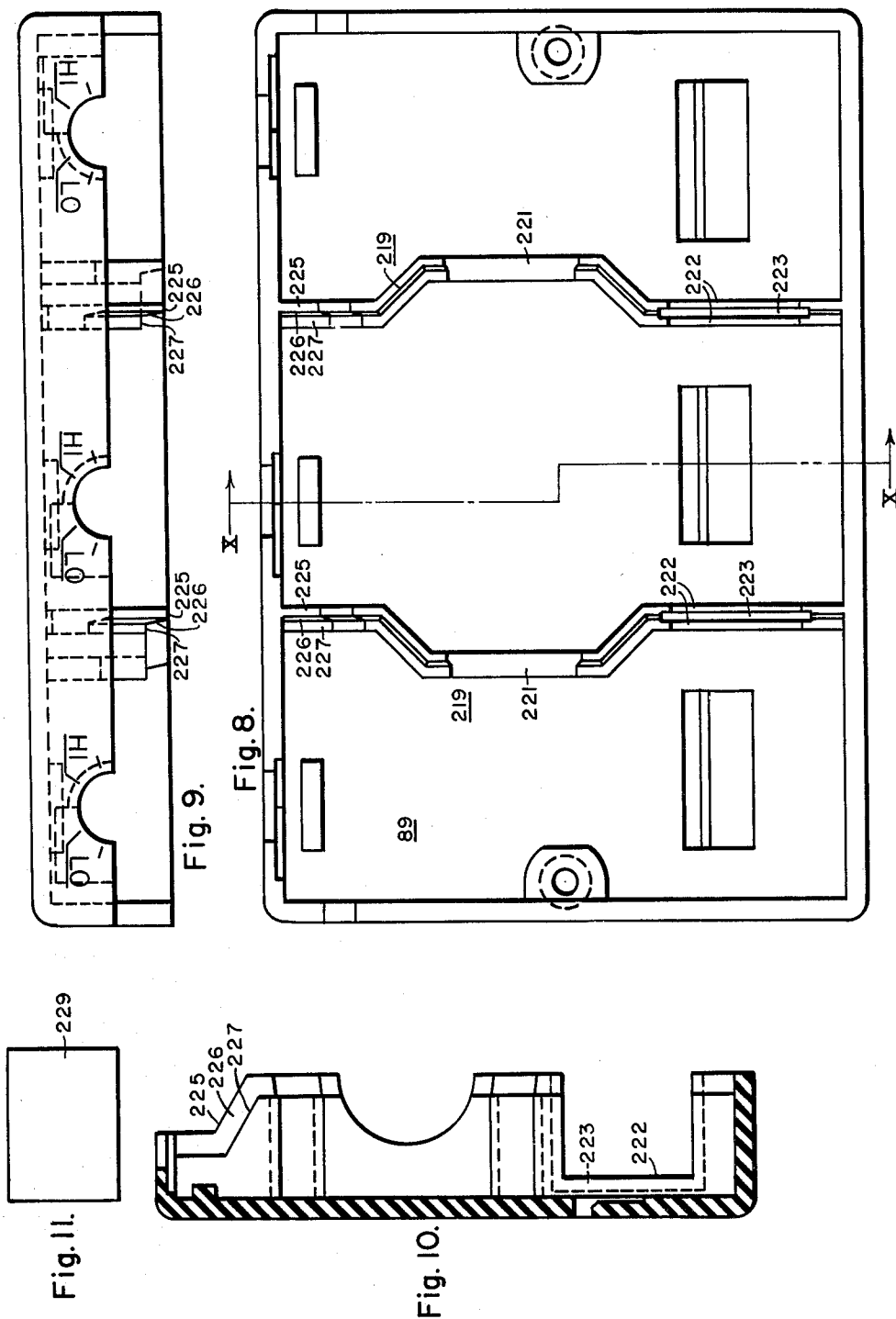
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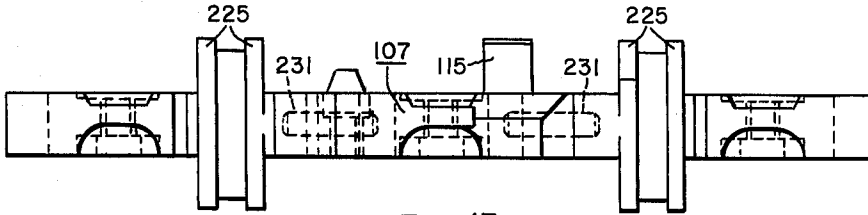


Fig. 13

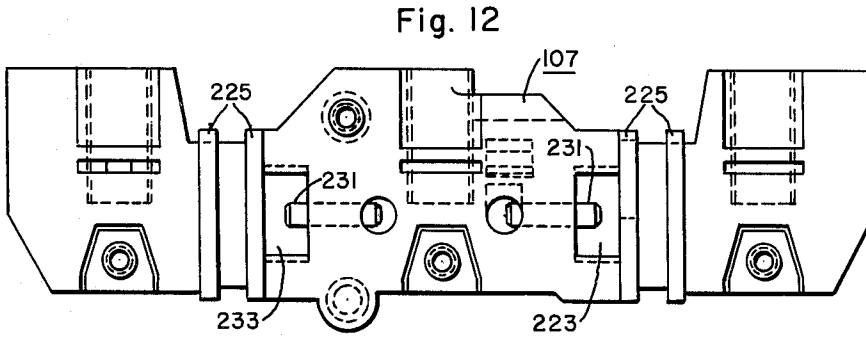


Fig. 12

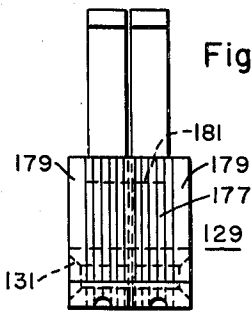


Fig. 15

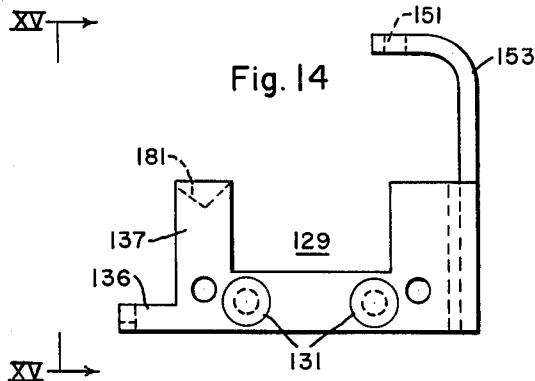


Fig. 14

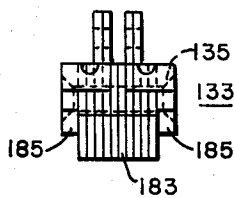


Fig. 17

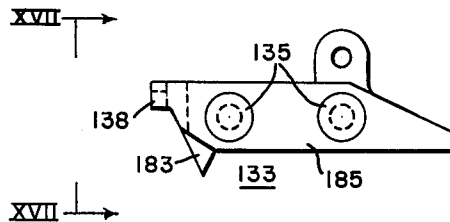


Fig. 16

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CIRCUIT BREAKER WITH IMPROVED TRIP-DEVICE ENCLOSURE

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4 Claims. (Cl. 200—116)

This invention relates, generally, to circuit breakers and, more particularly, to enclosed circuit breakers with automatic tripping means.

One object of the invention is to provide an improved circuit breaker of compact construction which is simple and inexpensive to manufacture and safe and reliable in operation.

Another object of the invention is to provide an enclosed multi-pole circuit breaker having an improved separately enclosed trip unit with means for isolating the several pole units within the trip unit from each other.

A further object of the invention is to provide a circuit breaker having a rotatable trip bar with improved means for rotatably supporting the trip bar within the circuit breaker.

Another object of the invention is to provide a circuit breaker having an adjustable trip device with improved means for achieving an initial adjustment or calibration during the assembly of the trip device.

A still further object of the invention is to provide a circuit breaker having an electro-magnetic trip device with improved means for supporting the armature on the magnetic yoke of the trip device.

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

FIGURE 1 is a side view in section of a circuit breaker constructed in accordance with the invention, the breaker being shown in the open position;

FIG. 2 is a plan view, on an enlarged scale, of the removable trip device of the breaker shown in FIG. 1;

FIG. 3 is a front view, with almost all of the cover broken away, of the trip device;

FIG. 4 is an enlarged sectional view taken along lines IV—IV of FIG. 3;

FIG. 5 is an elevational view on an enlarged scale of the insulating and supporting base of the trip device;

FIG. 6 is a sectional view taken along line VI—VI of FIG. 5;

FIG. 7 is a sectional view taken along line VII—VII of FIG. 5;

FIG. 8 is an elevational view of an enlarged scale of the insulating cover of the trip device;

FIG. 9 is a plan view of the trip device cover shown in FIG. 8;

FIG. 10 is a sectional view taken along lines X—X of FIG. 8;

FIG. 11 is an elevational view of a barrier that cooperates with the partition portions of the insulating trip device base and cover to enable isolation of the pole units of the trip device;

FIG. 12 is an elevational detailed view, on an enlarged scale, of the trip bar shown in FIG. 3;

FIG. 13 is a plan view of the trip bar shown in FIG. 12;

FIG. 14 is an elevational view on an enlarged scale of one of the magnetic yokes of the trip device shown in FIG. 3;

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FIG. 15 is an end view of the magnetic yoke shown in FIG. 14 looking in the direction of the arrows;

FIG. 16 is an elevational view on an enlarged scale of one of the armatures for the trip device shown in FIG. 3; and

FIG. 17 is an end view of the armature shown in FIG. 16 looking in the direction of the arrows.

Referring to FIG. 1 of the drawings, the circuit breaker shown therein comprises, generally, as a base 11 and a removable cover 13 both of which may be molded from a suitable insulating composition. The breaker is of the three-pole type, each pole being provided with terminals at opposite ends of the base 11 indicated generally at 15 and 17.

The circuit breaker includes a stationary contact 21, a movable contact 23 and an arc extinguisher indicated generally at 25, for each pole unit. A common operating mechanism indicated generally at 27 is provided for simultaneously actuating the three movable contacts to open and closed positions. A trip device indicated generally at 29 serves to effect automatic opening of the breaker contacts in response to predetermined over-load conditions in a circuit through any pole unit of the breaker.

The terminal 15 is disposed at the outer end of a conducting strip 31 which extends into the housing and rigidly supports the stationary contact 21. The movable contact 23 for each pole unit is mounted on a rigid contact arm 33 which is supported on a switch arm 35 secured to a tie bar 37 which extends across all of the pole units of the breaker and supports the switch arms for the several pole units for unitary movement to open and closed positions. The contact arm 33 is connected by means of a flexible conductor 39 to an intermediate or strip unit terminal member or conductor 41 which is secured at one end thereof to the base 11 by a screw 42. The conducting member 41 extends through the trip unit 29 and is connected at its outer end to the terminal structure 17.

The operating mechanism 27 is disposed in the center compartment of the housing and is supported by a pair of spaced frame members 53 (only one being shown) which are secured to the base 11. The operating mechanism comprises a pivoted forked operating lever 55, a toggle comprising toggle links 57 and 59, over-center spring means 61 and a pivoted releasable cradle 63 which is controlled by the trip device 29. An arcuate insulating shield 67 for substantially closing an opening 69 in the cover 13 is mounted on the end of the operating lever 55 and has an integral handle portion 71 extending out through the opening 69 to permit manual operation of the breaker.

The toggle links 57 and 59 are pivotally connected together by a knee pivot pin 73. One end of the toggle link 57 is bifurcated to straddle a pin 75 which is integral with the cradle 63. The toggle link 59 is pivotally connected to the switch arm 35 for the center pole unit, by a pin 77. The over-center springs 61 are connected under tension between the outer end of the operating lever 55 and a plate member 78 which is attached to the knee pin 73 of the toggle 57, 59.

The circuit breaker is manually operated to the open position by movement of the handle 71 in a counterclockwise direction to the "off" position, which movement actuates the over-center springs 61 to cause collapse of the toggle 57, 59 and opening movement of the switch arms 35 for all of the pole units of the breaker in a well-known manner. The breaker is shown in the open position in FIG. 1.

The circuit breaker is manually closed by reverse movement of the handle 71 from the "off" to the "on" position, which movement causes the over-center springs 61 to straighten the toggle 57, 59, thereby moving the switch

arms 35, for all of the pole units, to the closed position in a manner well-known in the art.

Referring to FIGS. 2, 3 and 4, the trip device 29 comprises an insulating base or support member 81 secured by means of rivets 83 (only one being shown in FIG. 4), or other suitable means, to a bracket 85 which is, in turn, secured to the base 11 of the circuit breaker by means of the screw 42 (FIG. 1). A cover 89 of insulating material cooperates with the insulating base 81 to enclose the trip device 29. The electro-responsive tripping means for the three pole units are the same, therefore, only the means for the center pole will be specifically described. The conducting member 41 for each pole unit has a looped portion 91 one leg of which is disposed adjacent to the base 81 and secured to the base by means of the rivets 83. A bimetallic element 93 has one end secured by means of rivets 95 to the other leg of the loop 91 of the conducting member 41. The rivets 95 also serve to secure the loop 91 and bimetal 93 to a bracket 97 that is secured to the trip unit base 81 by means (not shown) and that also supports the electro-magnetic trip means which will be hereinafter described. The free end of the bimetal 93 is disposed adjacent an adjusting screw 101 which is threaded into a tapped opening in a supporting member 103 that is attached by means of a rivet 105 to a trip bar 107. The trip bar 107 is rotatably supported in the strip device by means of the bracket 85 in a manner which will be hereinafter described. Spring means 109 and 111 are provided on opposite sides of the pivot of the trip bar 107 to keep the trip bar from rotating when the circuit breaker is jarred or jolted, thereby acting as an anti-shock device. The bias of the spring 111 against the base 81 is adjusted by means of a screw 113 in order to adjust the trip bar 107 to give the proper latch engagement which will be later described. In the normal position of the trip bar 107, a latch member 115 rigidly imbedded therein, engages a latch portion 117 of a latching mechanism which is indicated generally at 119 and which restrains the cradle 63 in the latched position shown in FIG. 1. The high expansion side of the bimetal element 93 is to the left as viewed in FIG. 4. When this element is heated a predetermined amount in response to overload currents, it deflects to the right to engage the adjusting screw 101 to rotate the trip bar 107 clockwise, as viewed in FIG. 4, about its pivot indicated generally at 121 causing the latch 115 to release the latch portion 117 of the latching mechanism 119, thus freeing the cradle 63 (FIG. 1). Although the breaker is shown in the open position in FIG. 1, it can be understood that the electro-responsive trip device 29 will operate only when the contacts are closed and a circuit is energized through the breaker. When the breaker is closed and the bimetal 93 operates to effect release of the latching mechanism 119 to release the cradle 63 (FIG. 1), the springs 61 rotate the cradle 63 in a clockwise direction, as viewed in FIG. 1, about its pivot 122 to cause collapse of the toggle 57, 59 and movement of the switch arms 35 and movable contacts 23 for all of the pole units of the breaker to the open circuit position. This movement also effects movement of the handle portion 71 to an intermediate position to indicate that the circuit breaker has tripped open. The breaker cannot be closed after a tripping operation until the handle 71 is moved to the fully open position during which movement a projection 123 of the bracket 55 engages a shoulder 125 of the cradle 63 rotating the cradle in a counterclockwise direction about its pivot 122 until the cradle re-engages the latching mechanism 119. After the cradle 63 has been relatched, the operating handle 71 can then be moved to the "on" position to effect closing of the contacts for all of the pole units in the same manner previously described.

The strip device 29 is also provided with electro-magnetic tripping means, indicated generally at 127, for each of the pole units of the breaker. The electro-magnetic tripping means 127 operates in response to over-loads

above a predetermined value, or in response to short circuits, to instantaneously actuate the trip bar 107 to trip the circuit breaker. Each electro-magnet comprises a fixed U-shaped laminated magnetic core member or yoke indicated generally at 129 and best illustrated in FIGS. 14 and 15, the laminations being secured together by means of rivets 131 (FIGS. 3 and 14). Each core member 129 is supported on the bracket 97 (FIG. 4) by means of two rivets 132 (FIG. 3). An armature indicated generally at 133 (FIGS. 16 and 17), which comprises a number of laminations secured together by means of rivets 135 (FIG. 16), is pivotally supported on one leg 137 (FIGS. 3 and 14) of the magnetic yoke 129 in a V-shaped pivot which will be hereinafter described. Referring to FIGS. 3 and 4, each of the armatures 133 is biased to the open position by means of two springs 140 which are supported under tension between a projection 136 of the magnetic yoke 129 and a projection 138 of the armature 133. An operating rod 139 having a head portion 141 is pivotally attached at its lower end to the armature 133 by means of a pin 143. The operating rod 139 extends through an opening in a metallic bracket 144 that is rigidly secured to the trip bar 107. Upon the occurrence of an over-load current above a predetermined value or in response to short circuits, in any of the pole units, the current in the conducting member 41, which passes through the opening defined by the legs of the U-shaped magnetic yoke 129 (FIG. 3), energizes the magnetic yoke causing the yoke to attract the armature 133. The armature 133 thereupon pivots, about the leg 137 of the yoke 129, against the bias of the springs 140, pulling the operating rod 139 downward whereupon the head portion 141 of the operating rod engages the bracket 144 on the trip bar 107 rotating the trip bar in a clockwise direction as viewed in FIG. 4 to effect release of the cradle 63 (FIG. 1) and tripping of the breaker in the same manner previously described.

The electromagnet is adjusted by means of an adjusting rod or cam follower indicated generally at 147 (FIGS. 3 and 4) which extends at its upper end through an opening in a bracket 149, that is attached to the trip unit base 81. The cam follower 147 extends, at its lower end, through an opening 151 (shown in dotted lines in FIG. 14) in a bracket 153 of magnetic material which extends from one leg of the magnetic yoke 129 and which functions not only to support the cam follower 147 but to exert a back pull on the armature 133. The upper end of the cam follower 147 engages a cam surface 155 (shown in dotted lines in FIGS. 3 and 4) on an adjusting member 157.

The adjusting member 157 is biased outwardly by a spring 161 which is disposed between the upper surface of a supporting plate 162 and a lower surface of a flange 163 which is molded integral with the adjusting member 157. There are a number of detents (not shown) in the cam surface 155 which receive the upper end of the cam follower 147 in order to positively position the member 147 to permit accurate adjustment of the electro-magnetic trip device 127. The adjusting member 157 is provided with a slot 165 (FIGS. 2 and 4) into which a screw-driver or other tool can be inserted to permit manual adjustment of the electro-magnetic trip device 127. The magnetic air gap between the armature 133 and the magnetic yoke 129 in each pole unit, is varied by rotation of the adjusting member 157 which movement rotates the cam surface 155 to move the cam follower 147 vertically, as seen in FIGS. 3 and 4, to thereby move the armature 133 about its pivot against the bias of the springs 140. As seen in FIG. 2, there are markings on the trip unit cover 89 that indicate the positions of the rotatable adjusting members 157 to thereby indicate the minimum amount of over-load current through any pole unit that will effect a magnetic tripping operation.

Improved means are provided for permitting an accurate and fine calibration of the electromagnetic trip device

127. Because the trip unit parts are manufactured and assembled in mass production, it can be understood that additional adjusting means is required in order to permit a fine calibration of each individual electro-magnetic trip device. As best illustrated in FIG. 3, the cam follower 147 is comprised of two parts 171 and 173. The upper portion of the lower part 173 is tapped to receive the lower portion of the upper part 171 which is threaded so that the length or vertical dimension of the cam follower 147 can be varied by rotating one of the parts 171 or 173 with respect to the other. During the assembly of the trip unit 29, a worker can test the unit and vary the length of the cam follower 147 until the electromagnet 127 effects a tripping operation upon the occurrence of a selected predetermined over-load current indicated by the position of the adjusting member 157 in relation to the markings (FIG. 2) on the trip unit cover 89. The joint between the members 171 and 173 can be cemented fast when the cam follower 147 is the correct length. Thus, an accurate, fine calibration of each individual pole unit can be readily effected.

In electromagnets embodying a clapper-type armature, there is a tendency for the armature to walk out of the pivot, i.e., to move in a direction normal to the plane in which the armature rotates, until the armature falls out of position. On the circuit breakers presently in use, side plates or brackets are provided to keep the armature in place. Improved means are provided for keeping the armature in position on the magnetic yoke without the use of any additional parts other than the armature and the magnetic yoke. Referring to FIG. 15, it will be seen that the magnetic yoke 129 comprises a plurality of inner laminations 177 which are sandwiched between two thicker outer laminations 179. As seen in dotted lines in FIGS. 14 and 15, a V-shaped slot 181 is provided in the inner laminations 177; the two outermost laminations 179 forming side walls at opposite ends of the slot 181. Referring to FIG. 17, the armature 133 comprises a plurality of inner laminations 183 sandwiched between two thicker outer laminations 185. The inner laminations 183 form a V-shaped pivoting portion at one end of the armature 133, the outer laminations 185 being cut away as shown in FIGS. 16 and 17. As best illustrated in FIGS. 3 and 4, the V-shaped or knife-edge pivoting portion of the inner laminations 183, of the armature 133, is positioned in the V-shaped pivot of the inner laminations 177 of the magnetic yoke 129 when the parts are in place. The magnetic yoke outer laminations 179 keep the armature 133 from moving or walking out of position during operation of the electro-magnet 127.

The circuit breaker insulating base 11 and cover 13 (FIG. 1) are provided with two sets of partition walls 191 and 193 (only one set being shown in FIG. 1) which cooperate to isolate the pole units of the portions of the circuit breaker adjacent the operating mechanism 27 and arc chutes 25 so that gases formed upon the extinction of the arcs, during an opening operation, will not cause flashovers between the pole units. The heat and pressure generated upon arc extinction force gases back into the enclosed trip device 29 through openings to be hereinafter described, and these gases could cause flashover between the pole units of the trip device.

Means, therefore, are provided for preventing the passage of gases between the pole units of the enclosed trip device 29. As seen in FIG. 5, there is an opening 195, for each pole unit, provided in the trip unit base 81 to permit passage of the conducting member 41 (FIG. 4). An opening 197 (FIG. 5) is provided in the center pole unit portion of the base 81 to allow passage of the latch portion 117 (FIG. 4) which is part of the latching mechanism 119. Two openings 199 (FIG. 5) are also provided in the center pole unit portion of the trip unit base 81 to allow passage of two arm members 201 (FIGS. 2 and 4) which members rotatably support the trip bar 107 in a manner to be hereinafter described. The open-

ings 195, 197 and 199 are large enough to permit easy and quick assembly of the trip device 29 and to permit easy and quick mounting of the trip device in the circuit breaker. These openings, therefore, are not completely closed when the trip device is assembled, and gases, formed upon the extinction of the arcs during an opening operation, pass back into the trip device. Means therefore, are provided for preventing passage of these gases between the pole units of the trip device.

Referring to FIGS. 5, 6 and 7, there are two partition portions 203, molded integral with the insulating trip unit base 81, that divide the base into three compartments for the three pole units of the trip device. A semi-circular opening 205 is provided in each of the partition portions 203. A rectangular opening 206 is also provided in each of the partition portions 203. A slot 207 is provided in the partition portions 203 adjacent each of the openings 206. The edges of the partition portions 203 comprise three surfaces 215, 216 and 217. As best seen in FIG. 6, the surfaces 215 and 217 are in different planes, and they are connected by the slanting surface 216.

Referring to FIGS. 8, 9 and 10 there are two partition portions 219, molded integral with the insulating trip unit cover 89, that divide the cover into three compartments corresponding to the three compartments in the trip unit base 89. A semi-circular opening 221 is provided in each of the partition portions 219. A generally rectangular opening 222 is provided in each of the partition portions 219 and a slot 223 is provided in the partition portions 219 adjacent each of the openings 222. The edges of the partition portions 219 comprise three surfaces 225, 226 and 227. The surfaces 225 and 227 are in different planes, and they are connected by the slanting surface 226.

When the cover 89 is placed over the base 81, the partition portions 219 of the cover 89 cooperate with the partition portions 203 of the base 81 to form partition walls between the compartments of the trip device. The surfaces 225, 226 and 227 of the edges of the partition portions 219 mate with the surfaces 215, 216 and 217, respectively, of the edges of the partition portions 203 providing irregular mating connecting surfaces that are lapped together to provide an effective seal between the compartments of the trip device.

The openings 205 in the base 81 cooperate with the openings 221 in the cover 89 to permit extension of the common trip bar 107 (FIG. 3) into each of the three pole units of the trip device 29. As seen in FIGS. 2, 3, 12 and 13, the trip bar 107 is provided with cylindrical flanges 225 which fit on opposite sides of the partitions that separate the trip unit compartments. The flanges 225 cooperate with the general mass of the trip bar 107 to close the openings 205, 221 in the trip unit partition walls.

The openings 206, 222 are provided to permit easy assembly of the springs 140 (FIG. 3) in the trip device. An insulating barrier 229 (FIG. 11) is provided for each of the partition walls 203, 219, (FIGS. 5-10) to fit into the slots 207 and 223 adjacent the openings 206, 222 to thereby close off each of the openings 206, 222 in the trip unit partition walls.

It can be understood that the irregular mating surfaces of the edges of the partition walls 203, 219, the flanges 225 on the trip member 107, and the barriers 229 all cooperate to effectively isolate the three pole units of the trip device 29 preventing passage of gases between the compartments and providing insulation between the live parts of the different pole units.

As was previously mentioned, when the trip bar 107 is in place in the trip device, the flanges 225 are positioned on opposite sides of each of the partition walls 203, 219 to cooperate with the general mass of the trip bar to thereby close the openings 205, 221 in the partition walls. It can be understood that during the assembly of the trip device 29, the amount of side movement of the trip bar 107 should be kept to a minimum in order that the flanges

225 on the trip bar 107 can be molded closely together so that they will be positioned close to the partition walls 203, 219 to more effectively close the openings 205, 221. It can be understood also that the trip bar 107 must be positively positioned in the trip device for proper latch engagement between the latch member 115 (FIG. 4) and the latch portion 117 of the latching mechanism 119.

Improved means, therefore, are provided for rotatably supporting the trip bar 107 within the trip device 29. Referring to FIG. 12, the trip bar 107 is provided with two metallic pins 231 that are rigidly embedded in the molded trip bar during the molding operation. An opening 233 is provided in the trip bar 107 near the outer end of each of the pins 231. As best illustrated in FIG. 2, these openings 233 provide access to the two independent supporting arms 201 (FIGS. 2 and 4) each of which has an opening near its inner end to receive one of the pins 231 whereby the trip bar 107 is rotatably supported on the supporting arms 201. Each of the supporting arms 201 extends through one of the openings 199 (FIG. 5) in the trip unit base 81 and is supported at its outer end on the bracket 85 (FIGS. 2 and 4) by means of a screw 237. Each of the supporting arms 201 is positively positioned with respect to the supporting bracket 85 by means of two dowels 241 and 243 (FIG. 4) in the bracket 85. Each of the arms 201 rests on top of one of the dowels 241 and receives the other dowel 243 in a semi-circular opening in the end of the arm. During the assembly of the trip device 29, the supporting arms 201 are placed over the pins 231 in the trip bar 107 and, with the trip unit cover 89 removed, the two arms 201 are placed through the openings 199 in the trip unit base 81 (FIG. 5). Each of the arms 201 is then positively positioned with respect to the bracket 85 by means of two dowels 241 and 243 (FIG. 4). The arms are then fastened securely to the bracket 85 by means of the screws 237. It can be understood that there is no side movement required of the trip bar 107, with respect to the trip unit base 81, during the assembly of the trip device 29, and therefore, the flanges 225 on the trip bar 107 can be molded close enough together to more effectively function as barriers aiding to isolate the compartments of the trip device.

Having described the invention in accordance with the patent statutes, it is to be understood that various changes and modifications may be made in the structural details and combinations of elements without departing from some of the essential features of the invention.

We claim as our invention:

1. A multi-pole circuit breaker comprising a first insulating housing, a circuit-breaker mechanism supported within said first housing and comprising a plurality of pole units, each pole unit comprising a pair of contacts, means releasable to effect simultaneous opening of all of said pairs of contacts, a multi-pole trip device supported within said first housing and comprising trip means for each of said pole units, each of said trip means being constructed to operate upon the occurrence of certain current conditions to effect release of said releasable means, a second housing within said first housing and comprising an insulating base and an insulating cover cooperating with said base to enclose said trip device, said second housing comprising a different compartment for each of said trip means and insulating barrier means between adjacent compartments, each of said barrier means comprising a first partition molded integral with said base and formed with a beveled surface at the end thereof, each of said barrier means comprising a second partition molded integral with said cover and formed with a beveled surface at the end thereof, and the beveled surface of each of said first partitions engaging the beveled surface of the associated second partition.

2. In a multi-pole circuit breaker having a trip device operable upon the occurrence of over-load currents in any or all of the pole units to effect a tripping opera-

tion of said breaker, and insulating enclosure for said trip device comprising a molded insulating base and a molded insulating cover, a partition member molded integral with said base and having an edge comprising at least two surfaces disposed in different planes, a partition member molded integral with said cover and having an edge comprising at least two surfaces disposed in different planes, said base partition member and said cover partition member cooperating to form a partition wall between two of the pole units of said circuit breaker, and the edges of said base and cover partition members mating to seal off the areas on opposite sides of said partition wall from each other.

3. A multi-pole circuit breaker comprising a first insulating housing, a circuit-breaker mechanism supported within said first housing and comprising a plurality of pole units, each of said pole units comprising a pair of contacts, means releasable to effect simultaneous opening of all of said pairs of contacts, a multi-pole trip device supported within said first housing and comprising trip means for each of said pole units, a second housing within said first housing and comprising an insulating base and an insulating cover cooperating with said base to enclose said trip device, said second housing comprising a different compartment for each of said trip means and an insulating barrier between each pair of adjacent compartments, each of said barriers being generally planar and comprising a first partition molded integral with said base which first partition comprises a surface at the end thereof that is slanted relative to the plane of the barrier, each of said barriers comprising a second partition molded integral with said cover which second partition comprises a surface at the end thereof that is slanted relative to the plane of the barrier, the slanted surface of each of said first partitions engaging and mating with the slanted surface of the associated second partition, an insulating trip member common to all of said trip means and extending into all of said compartments, each of said barriers having an opening therein through which said common trip member extends, said common trip member comprising an insulating flange on each of the two opposite sides of each of said barriers to substantially close each of said openings, and upon the occurrence of a predetermined amount of current in any of said pole units the associated trip means operating said common trip member to effect release of said releasable means.

4. A multi-pole circuit breaker comprising a first insulating housing, a circuit breaker mechanism supported within said first housing and comprising a plurality of pole units, each pole unit comprising a pair of contacts, means releasable to effect simultaneous opening of all of said pairs of contacts, a multi-pole trip device supported within said first housing and comprising trip means for each of said pole units, each of said trip means being constructed to operate upon the occurrence of certain over-load current conditions to effect release of said releasable means, a second insulating housing within said first housing and comprising an insulating base and an insulating cover cooperating with said base to enclose said trip device, said second housing comprising a different compartment for each of said trip means and insulating barrier means between adjacent compartments, and each of said barrier means comprising a first insulating partition on said base and a second insulating partition on said cover in lapping engagement with the first insulating partition.

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