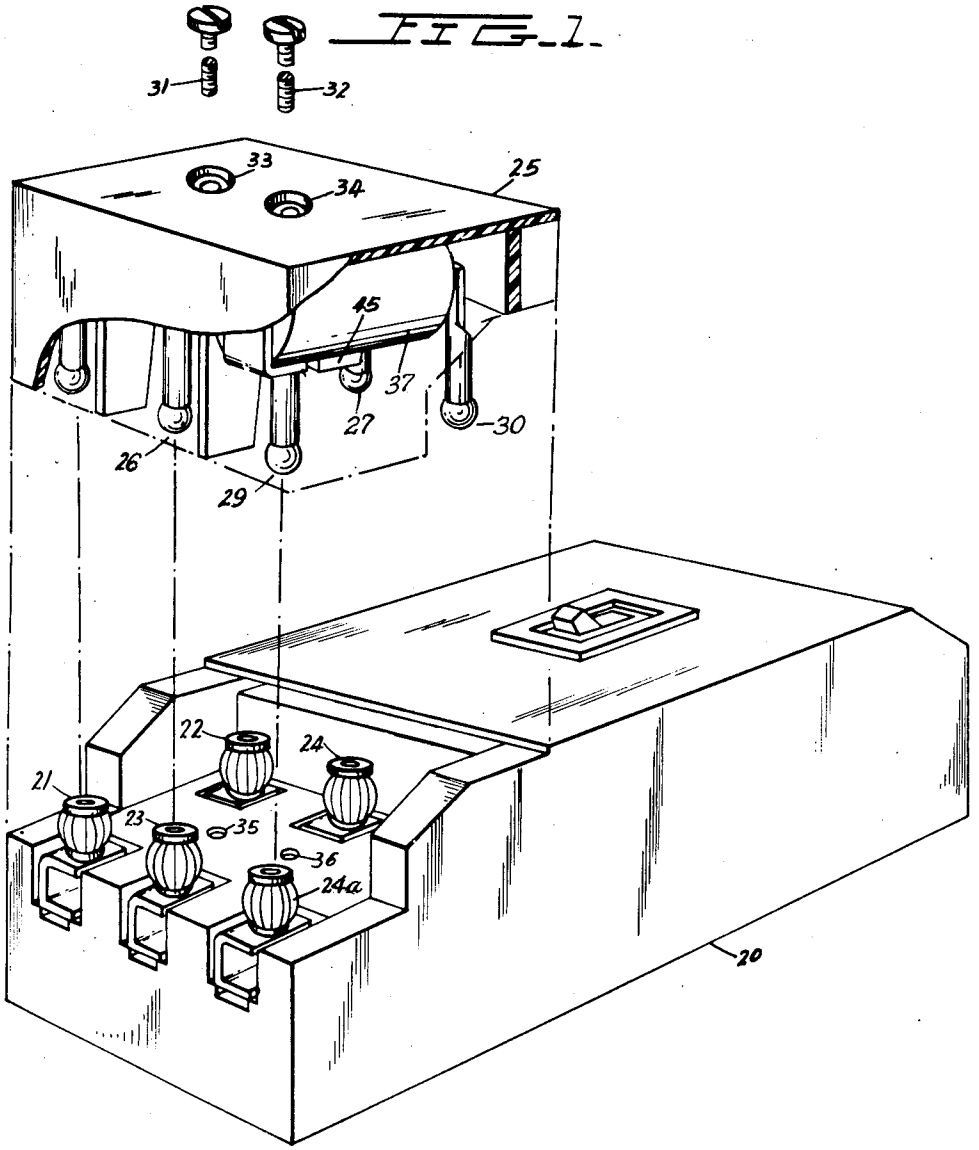
May 1, 1962 W. W. UECKER 3,032,629

TRIPPING MECHANISM FOR A COMBINED CIRCUIT BREAKER AND CURRENT LIMITING FUSE

Filed July 12, 1957 3 Sheets-Sheet 1

FIG. 1.



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TRIPPING MECHANISM FOR A COMBINED CIRCUIT BREAKER AND CURRENT LIMITING FUSE

Filed July 12, 1957 3 Sheets-Sheet 2

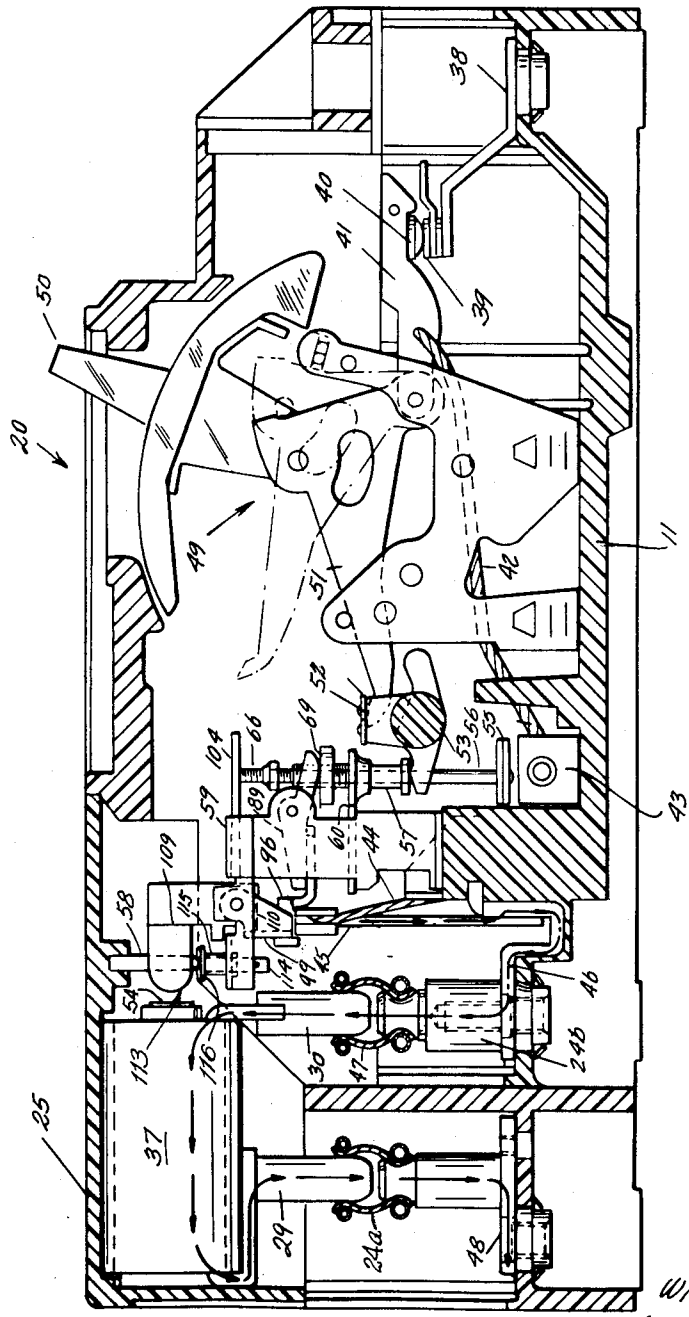


FIG. 2

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TRIPPING MECHANISM FOR A COMBINED CIRCUIT BREAKER AND CURRENT LIMITING FUSE

Filed July 12, 1957 3 Sheets-Sheet 3

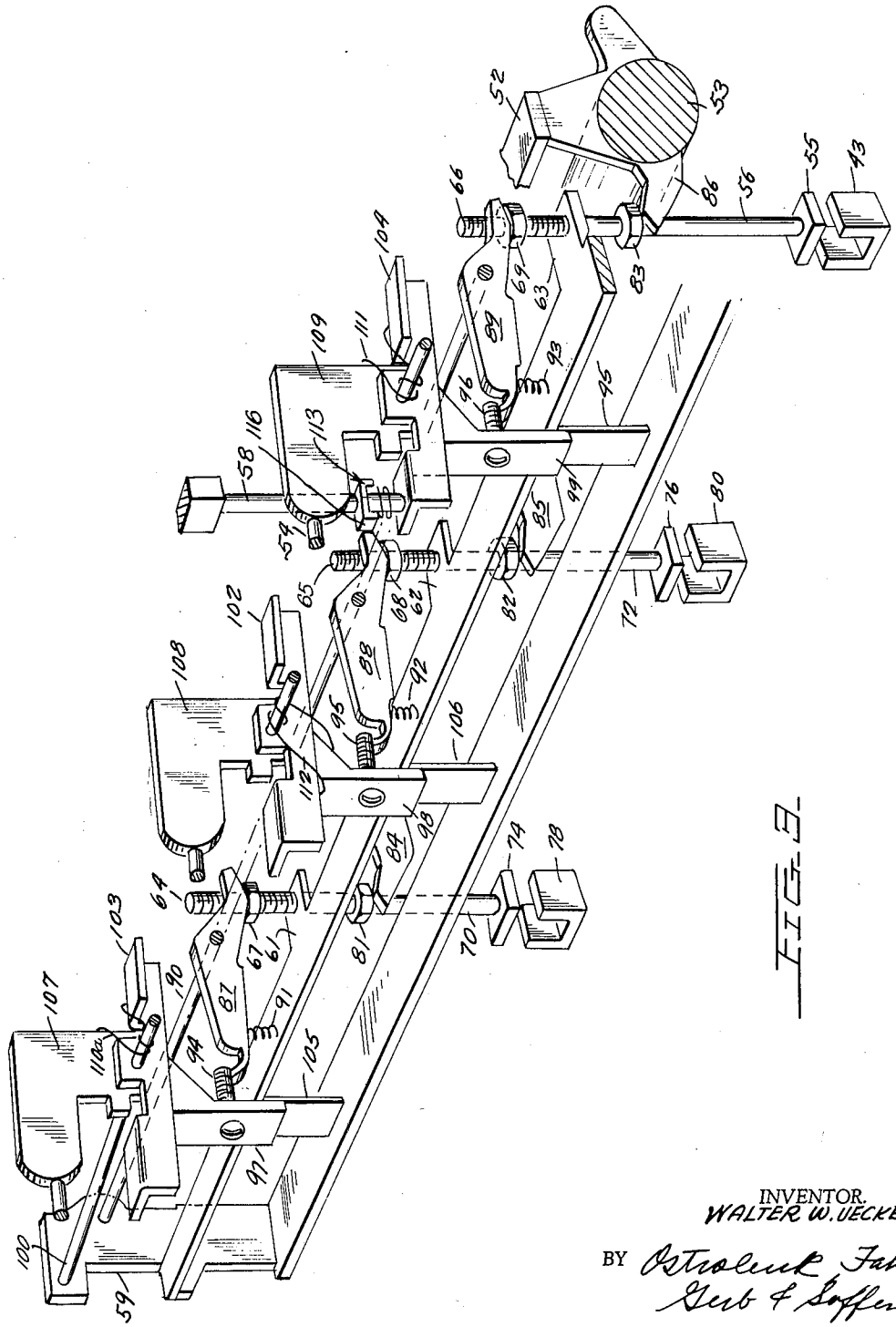


FIG. 3.

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Patented May 1, 1962

3,032,629

TRIPPING MECHANISM FOR A COMBINED CIRCUIT BREAKER AND CURRENT LIMITING FUSE

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Filed July 12, 1957, Ser. No. 671,531
7 Claims. (Cl. 200—88)

My invention relates to a novel trip mechanism for circuit interrupting devices of the type utilizing mechanical and electrical coordination between a circuit breaker and a current limiting fuse, and is more specifically directed to a spring trip type of tripping mechanism in combination with the above noted type of circuit interrupter.

Circuit interrupters utilizing a mechanically and electrically coordinated circuit breaker and current limiting fuse are fully described in copending application Serial No. 622,042, filed November 14, 1956, entitled "End Mounting of a Current Limiting Device Associated With a Circuit Breaker" to William Harold Edmunds, and assigned to the assignee of the instant application.

As seen in the above noted application, circuit interrupters utilizing a combined circuit breaker and current limiting fuse present many advantages, such as allowing a smaller circuit interrupting unit to be used for a given interrupting task, high speed operation, and prevention of single phasing when used in a multi-phase system, as well as many interlock features which are brought about by a removable electrical connection between the current limiting fuses and the circuit breaker device.

Mechanically, the device is comprised of a circuit breaker which can be positioned in a first housing, and a current limiting fuse device which can be positioned in a second housing. These two devices are then electrically connectable with respect to one another through any desired connecting means such as plug-in connectors.

The circuit breaker may be of any desired standard type such as the type where the contacts are maintained in the engaged position by a latch means which is defeatable by the operation of a tripper bar associated therewith. This tripper bar is, in turn, actuated by thermal trip means and magnetic trip means respectively which are associated with the circuit breaker for allowing circuit interruption responsive to prolonged overload currents, or fo relatively low short circuit currents respectively. When the short circuit current, however, is of a relatively high magnitude, then the current limiting fuse will operate to anticipate the high short circuit current and to interrupt this current before it reaches an appreciable value.

Mechanical coordination is provided between the current limiting fuse and the circuit breaker which could comprise a plunger associated with the current limiting fuse and which is ejected responsive to operation of the current limiting fuse, so as to cause operation of the circuit breaker tripper bar whereby the circuit breaker contacts are moved to their disengaged position responsive to operation of the current limiting fuse.

If the circuit breaker is of the multi-phase type, the usual practice is to have each of the pairs of contacts for each phase operated from the single tripper bar. Thus, if any one of the current limiting fuses is operated, then each phase of the circuit breaker contacts will be operated to a disengaged position to thereby prevent a possible single phasing condition.

A further interlocking means may be provided between the current limiting fuse and the circuit breaker tripper bar whereby a mechanical disconnection of the current limiting fuses and circuit breaker may cause operation of the tripper bar and a disconnection of the circuit

breaker contacts so as to provide a positive disconnection of the circuit associated with this circuit interrupter.

In the past, the tripping mechanisms corresponding to the thermal trip, magnetic trip, the current limiting fuse plunger trip, and the disconnection trip elements have each operated directly on the circuit breaker common tripper bar. Because of this, each of these trip elements had to deliver a substantial force in order to unlatch the tripper bar against relatively substantial latching forces. Furthermore, after tripping of the circuit breaker contacts it was necessary, in order to relatch the circuit breaker, to operate against the relatively high force transmitting elements.

The essence of the instant invention is to provide a novel structure wherein each of the auxiliary trip elements operate against the tripper bar in a so-called spring trip type of mechanism. That is to say, the power required to operate the tripper bar will now come from an auxiliary biasing means which could be a spring type of device, although it is not necessarily limited thereto, whereby the various tripping means merely operate to release the potential energy of this biasing means.

Therefore, a considerably smaller force will be able to cause a subsequent tripping of the circuit breaker contacts, since the auxiliary tripping devices need not operate directly on the tripper bar to thereby require relatively strong unlatching forces, but now merely operate to release the force of some auxiliary force transmitting means which can then operate directly on a tripper bar.

My novel spring trip mechanism for the type circuit interrupter described herein is further desirable since it allows an easier reset operation of the circuit breaker.

Many other advantages are attendant with my novel invention. By way of example, the various trip elements may now be more accurately calibrated since greater consideration can be given to their accuracy and less consideration given to their force transmission. Furthermore, since the components can now be relatively light, and the force transmitting means, which is released to operate on the tripper bar, can be relatively strong, the circuit breaker contacts may be operated in a shorter time than previously possible.

Accordingly, a primary object of my invention is to provide a novel tripping mechanism which releases auxiliary force transmitting means.

Another object of my invention is to provide a spring trip mechanism for circuit interrupters which are comprised of electrically and mechanically coordinated circuit breakers and current limiting fuses.

A still further object of my invention is to provide a novel tripping mechanism for a combined circuit breaker and current limiting fuse wherein the circuit breaker tripper bar is operated from a force transmitting means which is normally maintained ineffective, and is released responsive to the operation of certain trip elements of the system.

Another object of my invention is to provide a simplified tripping mechanism for circuit interrupters comprised of coordinated current limiting fuses and a circuit breaker.

These and other objects of my invention will become apparent from the following description when taken in connection with the drawings, in which:

FIGURE 1 shows an exploded perspective view of a circuit interrupter comprised of a circuit breaker contained within a first housing and current limiting fuses contained within a second housing wherein the first and second housings are connectable with respect to one another.

FIGURE 2 is a longitudinal cross-section of a side elevation of the circuit interrupter of FIGURE 1.

FIGURE 3 is a perspective view of the tripping mechanism of my novel invention shown in FIGURE 2.

Referring now to FIGURE 1 which generally shows the type circuit interrupting device to which my invention may be applied, a circuit breaker 20 which may be of the type shown in U.S. Patent No. 2,574,093, issued November 6, 1951, and assigned to the assignee of the instant invention, is provided with a pair of disconnect contacts for each of three phases. By way of example, contacts 21 and 22 which may be of the tulip-clip type described in copending application Serial No. 536,586, assigned to the assignee of the instant invention, are associated with a first phase, while contacts 23 and 24 are associated with a second phase, and still another pair of contacts including contact 24*a* are associated with the third phase.

A housing 25 is then provided which contains current limiting fuses therein to be placed in series with a respective circuit breaker phase. Each of the fuses contained within housing 25 is provided with disconnect contacts such as contacts 29 and 30 for the fuse 37, and contacts 26 and 27 of the fuse of the second phase.

Clearly, the disconnect contacts 26 and 27 of the current limiting fuse of the second phase will cooperate with contacts 23 and 24 of the circuit breaker housed in the housing 20, and the corresponding contacts of the other phases will cooperate in a similar manner.

Thus, the two housings may be removably connected to one another so that when they are connected each circuit breaker phase will have a current limiting fuse connected in series therewith.

In order to rigidly secure the two housings 20 and 25 to one another, screws or fastening means 31 and 32 are passed through openings 33 and 34 of current limiting fuse housing 25 to engage cooperating openings 35 and 36 respectively of the circuit breaker of FIGURE 1. For further details of this construction, reference is made to previously described application Serial No. 622,042 filed November 14, 1956.

FIGURE 2 shows a cross-sectional view through one phase of the device of FIGURE 1 when the housings are connected to one another, this phase being arbitrarily chosen to include the phase associated with current limiting fuse 37 having disconnect contacts 29 and 30 associated therewith. The current path of the phase shown in FIGURE 2 includes the terminal member 38 of circuit breaker 20, stationary contact 39, movable contact 40, contact arm 41, pigtail 42 (which passes through stationary magnet member 43 of the magnetic trip unit and emerges as pigtail 44), bi-metal 45, conductor 46, terminal member 24*b*, tulip-clip 47, disconnect 30, fuse 37, disconnect 29, terminal member 24*a*, and thence to terminal connector 48. This current path has been partially shown in the drawing by the arrows flowing through these current carrying elements.

The circuit breaker operating mechanism which is more fully described in the above noted Patent No. 2,574,093 generally includes an operating mechanism 49 which is operated through an operating handle 50. This operating mechanism is operatively connected between the contact arm 41 and a latch arm 51 which cooperates with a latch plate 52 of common tripper bar 53.

In operation, when the circuit breaker contacts are in the engaged position, as is shown in FIGURE 2, the latch plate 52 will be in engagement with the latch arm 51 of the circuit breaker operating mechanism 49. When, however, the tripper bar 43 is rotated in a counterclockwise direction by the trip mechanism to be hereinafter described and which constitutes my novel invention, the latch arm 51 is unlatched and rotates to the dot-dash line shown in the drawing, and the contact arm 41 and movable contact 40 are moved to a disengaged position.

The current limiting fuse 37 which is described in more detail in above noted copending application Serial No. 622,042 as well as in copending application Serial No. 461,378 filed October 11, 1957, includes a striker pin 54 which will be ejected to the right responsive to operation of current limiting fuse 37. This, as will be seen hereinafter, is one mode of tripping the circuit interrupter.

The second manner in which a circuit interrupter may be tripped is by a relatively low short circuit current which is insufficient to operate the current limiting fuse 37, but is sufficient to energize magnet 43 to strongly attract its cooperating armature 55 which is attached to shaft 56 and bushing 57 of shaft 56 to thereby rotate the tripper bar 53 in a counterclockwise direction.

Still another mode of operating the circuit breaker is by means of the bi-metal 45 which will deflect to the left and, as will be seen hereinafter, causes tripping of the circuit breaker contacts.

A still further desired mode of tripping the circuit breaker contacts is to achieve tripping responsive to disconnection between housings 25 and 20. This, as will be more fully described hereinafter, is accomplished by means of the pin 58 which is attached to the housing 25.

A description of my novel spring trip mechanism may be best understood by reference to the perspective view of FIGURE 3 in conjunction with the cross-sectional view of FIGURE 2. The tripping mechanism is supported at one end by a saddle-shaped member 59 of FIGURES 2 and 3 and a similar saddle-shaped support positioned on the other side of the circuit breaker, but not shown in the drawings for the sake of clarity.

The pair of saddle-shaped members, including member 59, are supported in turn from the molded housing, as is best seen in FIGURE 2, and support a platform 60 having protruding ears 61, 62 and 63 (FIGURE 3) which pass the threaded members 64, 65 and 66 respectively, having the adjustable nuts 67, 68 and 69 thereon.

It is to be noted that the shafts 64, 65 and 66 are axially movable with respect to their supporting ears and that they are rigidly connected to shafts 70, 72 and 56 respectively.

Each of shafts 70, 72 and 56 are terminated with armature members 74, 76 and 55 respectively which cooperate with the U-shaped stationary magnet members 78, 80 and 43 respectively so as to comprise the magnetic trip unit for the circuit breaker.

In general, a downward movement of any of shafts 64, 65 or 66, whether due to the magnetic action of the armatures terminating the shafts, or due to some other means will rotate the tripper bar 53 counterclockwise so as to achieve disengagement of the circuit breaker contacts. This action is achieved since each of shafts 64, 65 and 66 have bushing members 81, 82 and 83 adjustably positioned thereon which cooperate with arms 84, 85 and 86 of the tripper bar 53. Thus, a downward motion of any of shafts 64, 65 or 66 will drive its respective arm 84, 85 or 86 downward so as to rotate tripper bar 53 counterclockwise.

It is to be noted that in the embodiment of FIGURES 2 and 3 that the circuit breaker magnetic trip can act directly on the tripper bar since there is considerable energy available in the magnetic field created during the short circuit condition.

In order to drive shafts 64, 65 and 66 downward responsive to operation of trip units other than the magnetic trip unit of the circuit breaker, spring biased latchable members 87, 88 and 89 are provided for each of the three respective phases of the circuit interrupter. Each of members 87, 88 and 89 are supported from a separate shaft 90 located in each phase and are rotatable thereon, shaft 90 being supported from the saddle support members, including member 59, as is best seen in FIGURE 3.

Relatively strong compression spring members 91, 92 and 93 (FIGURE 3) are then positioned between the platform 60, which can also be individual to each phase

and latchable members **87**, **88** and **89** respectively so that these latchable members are biased to rotate in a clockwise direction.

Because of this bias, if the latchable members are not latched against this clockwise rotation, their right-hand portions bearing on adjustable nuts **67**, **68** and **69** will tend to drive shafts **64**, **65** and **66** respectively downward so as to achieve tripping of the circuit breaker. This rotation, however, is normally prevented when the circuit breaker contacts are engaged and circuit conditions are normal, by means of cooperating latch members **94**, **95** and **96**, which may be threadably adjustable members supported from members **97**, **98** and **99** respectively.

As is best seen for the case of member **99** in FIGURE 3, each of the members have a protruding section which is pivotally mounted on shaft **100** which is supported from the saddle supports, including saddle support member **59**, so as to be rotatable in a clockwise direction.

Each of members **97**, **98** and **99** are maintained in their normal latching position by a light spring biasing means such as the spring biasing means **111** which is supported by shaft **100** and has one end thereof supported against a stationary structural member **102** and its other end fastened to member **98** so as to normally maintain member **98** in a counterclockwise position or latching position, the end limit of this rotation being determined by a stop means, not shown.

Clearly, each of members **97** and **99** will have a similar type of biasing means such as spring **112** which cooperates with stationary support members **103** and **104** but it has been deleted for these two phases to clarify the drawing.

The main function of members **97**, **98** and **99** is to achieve tripping of the circuit breaker responsive to overload conditions which cause a deflection of bi-metal members **105**, **106** and **45** respectively, which correspond to a respective phase of the circuit breaker.

Thus, when a predetermined overload current flows for a predetermined time, the bi-metal element of the associated phase will warp to the left to thereby engage the lower portion of its respective member **97**, **98** or **99** to thereby rotate its said respective member about shaft **100** in a clockwise direction. This operation, then, will move the respective cooperating latch members **94**, **95** or **96** away from its respective latchable member **87**, **88** or **89** respectively whereby spring biasing member **91**, **92** or **93** respectively will drive its corresponding latchable member in a clockwise direction, thus achieving tripping of the circuit breaker responsive to overload conditions.

It is to be clearly noted that this bi-metal trip element operates in a purely spring trip fashion wherein the bi-metal need only deliver sufficient force to release the auxiliary latch between members **89** and **96** whereby the relatively strong spring **93** will deliver a relatively large force to cause operation of tripper bar **53**.

In order to cause circuit breaker operation responsive to operation of any of the current limiting fuses, further members **107**, **108** and **109** corresponding to each respective phase are pivotally mounted on the shaft **100** supported from the saddle support member **59**.

The shape of members **107**, **108** and **109** is best seen in conjunction with saddle support member **109** in FIGURE 3 wherein each of the members is provided with a lower protruding portion **110** which is positioned adjacent a transverse portion of the corresponding member **99** which is operated directly by the bi-metal **45**.

The effect of this structure is such that a rotation of any of members **107**, **108** or **109** in a clockwise direction will cause its lower portion, such as portion **110** of member **109**, to pick up a portion of the associated member **97**, **98** or **99**, the portion **110** being previously described as picking up member **99**.

When these members engage, it is clear that a continued rotation of one of the members, such as member **109** in a clockwise direction will initiate the rotation of the member such as member **99** in a clockwise direction so as to cause an unlatching between latch members **96** and **89**, thus achieving subsequent rotation of tripper bar **53** and operation of the circuit breaker contacts to their disengaged position.

The normal position for members **107**, **108** and **109** is that seen in FIGURES 2 and 3, these members being biased in a counterclockwise direction by biasing springs, such as spring **110***a* and **111** for members **107** and **109** respectively, the biasing spring for member **108** being deleted for purposes of clarity. Each of members **107**, **108** and **109** are therefore biased to a maximum counterclockwise position, and further movement is prevented by stop means, not shown.

As may be best seen in FIGURE 2 and as fragmentarily shown in FIGURE 3, the upper rounded portion of members **107**, **108** and **109** are positioned adjacent the striker pin, such as striker pin **54** of their respective current limiting fuse (FIGURE 2) whereby operation of the associated current limiting fuse will eject its corresponding striker pin so as to strike its corresponding member **107**, **108** or **109** respectively and thus drive this member in a clockwise direction.

By way of example, operation of current limiting fuse **37** will cause an ejection of striker pin **54** which will move into engagement with member **109** and drive member **109** clockwise against the biasing force of its biasing spring **111**. This clockwise rotation of member **109** will cause its lower portion **110** to pick up member **99** and thereby cause member **99** to rotate in a clockwise direction along with member **109**. Thus, the latch between the cooperating latch elements **96** and **89** will be defeated, and the circuit breaker contacts will be operated.

Clearly, a similar operation will proceed for the other current limiting fuse phases when their fuse is operated so that single phasing will be prevented by causing an operation of all of the circuit breaker contacts responsive to operation of any one of the current limiting fuses.

Here again it is essential to note, that in accordance with my novel invention, the striker pin force need not be sufficient of itself to operate the tripper bar **53** with the circuit breaker, but need only be sufficient to achieve unlatching of the auxiliary latch means which normally restrains the biasing springs **91**, **92** and **93** which are sufficiently powerful to operate the tripper bar **53** when they are released.

As has been previously described in my copending application Serial No. 622,042 it is desirable to have the circuit breaker contacts operated to their disengaged position responsive to a physical disconnection between the current limiting fuses and the associated circuit breaker. This may be achieved in my novel tripping mechanism by providing for any one of the phases, a means for normally biasing any of members **97**, **98** and **99** or **107**, **108** or **109** in a clockwise direction, this biasing means being defeated when the current limiting fuse housing **25** is in engagement with the circuit breaker housing **20**.

One manner in which this may be accomplished is shown in FIGURES 2 and 3 as including a protruding member **58** which is fastened to the current limiting fuse housing **25** and cooperates with a spring plunger mechanism seen generally at **113** in FIGURES 2 and 3. This plunger mechanism is supported by the support member **104** and includes a shaft member **114** which protrudes through the support **104**, and a spring member **115** which is supported thereon and has one end terminated at the surface of support member **104** and its other end terminated by a flared member **116** which is fastened to the top of shaft **114** and is positioned beneath member **109**. The protruding member **58** of housing **25** is constructed to depress the shaft **114** against the force of biasing spring **115** and hold the flared top member **116** out of engagement with member **109** so long as the housing **25** is in engagement with respect to housing **20**. When, however, the housing **25** is disengaged and protruding member **58** is removed from flared extension **116**, the biasing spring **115** will drive shaft **114** upwardly to bring the top of

flared member 116 into engagement with member 109 and thus rotate member 109 in a clockwise direction to achieve a subsequent tripping of the circuit breaker contacts.

It is to be noted that it will not be possible to reset the circuit breaker until the housing 25 is once again connected in series with housing 20 and the biasing spring 115 is thereby defeated.

In summary, my novel spring trip mechanism allows operation of tripper bar 53 and disengagement of the circuit breaker contacts in any one of three ways.

Thus, when a prolonged overload current flows and the bi-metal, such as bi-metal 45, warps to the left, member 89 will be rotated clockwise by the relatively high force of spring 93 to rotate tripper bar 53 and operate the circuit breaker.

When the current limiting fuse is operated, such as current limiting fuse 37, then its striker pin 54 will be ejected to rotate member 109 in a clockwise direction. The lower portion 110 of member 109, however, will pick up member 99 to cause member 99 to rotate clockwise, and once again the force of spring 93 will be released to achieve subsequent tripping of the circuit breaker.

A still further method of achieving the trip is by the release of member 58 in a disconnecting housing 25 and 20 whereby the spring 115 will drive shaft 114 upwardly and into engagement with member 109 to once again rotate member 109 clockwise and achieve a subsequent tripping of the circuit breaker.

The magnetic trip of the circuit breaker tripping mechanism may operate directly on the tripper bar 53, since substantial force is readily available, though it would be apparent to any one skilled in the art, after studying my novel invention, that the magnetic trip elements could operate through the spring trip system heretofore described. In the instant embodiment, however, the magnetic trip system for the phase including U-shaped magnet 43 and its cooperating armature 55, operates directly on the tripper bar through the shaft 56 and bushing 57 whereby the occurrence of a relatively low short circuit current will cause armature 55 to be attracted to its cooperating stationary magnet 43, thus driving the tripper bar 53 in a counterclockwise direction.

In the foregoing I have described my invention in connection with illustrative embodiments thereof, since many variations and modifications of my invention will now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. In combination, a spring trip mechanism and a circuit interrupting device; said circuit interrupting device being comprised of a series connected circuit breaker and current limiting fuse, said circuit breaker having cooperable contacts movable to a disengaged position responsive to operation of a tripper bar means; said circuit breaker including thermal trip means, said current limiting fuse including short circuit trip means; said spring trip mechanism including force transmitting means operatively connectable to said tripper bar for operating said tripper bar and means for maintaining said force transmitting means inoperative during normal conditions of a circuit containing said circuit interrupting device; said thermal trip means and said short circuit trip means associated with said current limiting device being constructed to defeat said means normally maintaining said force transmitting means inoperative responsive to a prolonged overload or a relatively severe short circuit condition respectively; said spring trip mechanism further including mechanism for defeating said means for normally maintaining said force transmitting means inoperative responsive to disconnection of said current limiting fuse and said circuit breaker.

2. In combination, a spring trip mechanism and a circuit interrupting device; said circuit interrupting device being comprised of a series connected circuit breaker and current limiting fuse, said circuit breaker having cooperable contacts movable to a disengaged position responsive to operation of a tripper bar means; said circuit breaker including thermal trip means, said current limiting fuse including short circuit trip means; said spring trip mechanism including force transmitting means operatively connectable to said tripper bar for operating said tripper bar and means for maintaining said force transmitting means inoperative during normal conditions of a circuit containing said circuit interrupting device; said thermal trp means and said short circuit trip means associated with said current limiting device being constructed to defeat said means normally maintaining said force transmitting means inoperative responsive to a prolonged overload or a relatively severe short circuit condition respectively; said spring trip mechanism including a first and second member for operatively connecting said thermal trip means and said short circuit trip means respectively to said means normally maintaining said force transmitting means inoperative responsive to their operation; said spring trip mechanism further including mechanism for defeating said means for normally maintaining said force transmitting means inoperative responsive to disconnection of said current limiting fuse and said circuit breaker.

3. In combination, a spring trip mechanism and a circuit interrupting device; said circuit interrupting device being comprised of a series connected circuit breaker and current limiting fuse, said circuit breaker having cooperable contacts movable to a disengaged position responsive to operation of a tripper bar means; said circuit breaker including thermal trip means, said current limiting fuse including short circuit trip means; said spring trip mechanism including force transmitting means operatively connectable to said tripper bar for operating said tripper bar and means for maintaining said force transmitting means inoperative during normal conditions for a circuit containing said circuit interrupting device; said thermal trip means and said short circuit trip means associated with said current limiting device being constructed to defeat said means normally maintaining said force transmitting means inoperative responsive to a prolonged overload or a relatively severe short circuit condition respectively; said spring trip mechanism including a first and second member for operatively connecting said thermal trip means and said short circuit trip means respectively to said means normally maintaining said force transmitting means inoperative responsive to their operation; said spring trip mechanism further including mechanism for defeating said means for normally maintaining said force transmitting means inoperative responsive to disconnection of said current limiting fuse and said circuit breaker; said circuit breaker further containing magnetic trip means constructed to operate said tripper bar responsive to relatively low short circuit currents.

4. In combination, a spring trip mechanism and a circuit interrupting device; said circuit interrupting device being comprised of a series connected circuit breaker and current limiting fuse, said circuit breaker having cooperable contacts movable to a disengaged position responsive to operation of a tripper bar means; said circuit breaker including thermal trip means, said current limiting fuse including short circuit trip means; said spring trip mechanism including force transmitting means operatively connectable to said tripper bar for operating said tripper bar and means for maintaining said force transmitting means inoperative during normal conditions of a circuit containing said circuit interrupting device; said thermal trip means and said short circuit trip means associated with said current limiting device being constructed to defeat said means normally maintaining said force transmitting means inoperative responsive to a prolonged overload or a relatively severe short circuit condition respectively; said force transmitting means comprising a spring normally maintained in an energy storing position; said spring trip mechanism further including mechanism for

defeating said means for normally maintaining said force transmitting means inoperative responsive to disconnection of said current limiting fuse and said circuit breaker.

5. In combination, a spring trip mechanism and a circuit interrupting device; said circuit interrupting device being comprised of a series connected circuit breaker and current limiting fuse, said circuit breaker having cooperable contacts movable to a disengaged position responsive to operation of a tripper bar means; said circuit breaker including thermal trip means, said current limiting fuse including short circuit trip means; said spring trip mechanism including force transmitting means operatively connectable to said tripper bar for operating said tripper bar and means for maintaining said force transmitting means inoperative during normal conditions of a circuit containing said circuit interrupting device; said thermal trip means and said short circuit trip means associated with said current limiting device being constructed to defeat said means normally maintaining said force transmitting means inoperative responsive to a prolonged overload or a relatively severe short circuit condition respectively; said force transmitting means comprising a spring normally maintained in an energy storing position; said spring trip mechanism further including mechanism for defeating said means for normally maintaining said force transmitting means inoperative responsive to disconnection of said current limiting fuse and said circuit breaker; said circuit breaker further containing magnetic trip means constructed to operate said tripper bar responsive to relatively low short circuit currents.

6. In combination, a spring trip mechanism and a circuit interrupting device; said circuit interrupting device being comprised of a series connected circuit breaker and current limiting fuse, said circuit breaker having cooperable contacts movable to a disengaged position responsive to operation of a tripper bar means; said circuit breaker including thermal trip means, said current limiting fuse including thermal trip means, said current limiting fuse including short circuit trip means; said spring trip mechanism including force transmitting means operatively connectable to said tripper bar for operating said tripper bar and means for maintaining said force transmitting means inoperative during normal conditions of a circuit containing said circuit interrupting device; said thermal trip means and said short circuit trip means associated with said current limiting device being constructed to defeat said means normally maintaining said force transmitting means inoperative responsive to a prolonged overload or a relatively severe short circuit condition respectively; said force transmitting means comprising a spring normally maintained in an energy storing position; mechanism including spring bias means mounted on said spring trip mechanism operable to move said tripper bar responsive to disconnection of said current limiting fuse and said circuit breaker for moving said tripper bar to a position to disengage the said cooperable contacts.

7. In combination, a spring trip mechanism and a circuit interrupting device; said circuit interrupting device being comprised of a series connected circuit breaker and current limiting fuse, said circuit breaker having cooperable contacts movable to a disengaged position responsive to operation of a tripper bar means; said circuit breaker including thermal trip means, said current limiting fuse including short circuit trip means; said spring trip mechanism including force transmitting means operatively connectable to said tripper bar for operating said tripper bar and means for maintaining said force transmitting means inoperative during normal conditions of a circuit containing said circuit interrupting device; said thermal trip means and said short circuit trip means associated with said current limiting device being constructed to defeat said means normally maintaining said force transmitting means inoperative responsive to a prolonged overload or a relatively severe short circuit condition respectively; said force transmitting means comprising a spring normally maintained in an energy storing position; mechanism including spring bias means mounted on said spring trip mechanism operable to move said tripper bar responsive to disconnection of said current limiting fuse and said circuit breaker for moving said tripper bar to a position to disengage the said cooperable contacts; said circuit breaker further containing magnetic trip means constructed to operate said tripper bar responsive to relatively low short circuit currents.

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