July 10, 1962 A. BODENSCHATZ 3,043,934

BOLTED CONNECTION FOR CURRENT LIMITING FUSES

Filed Nov. 24, 1959 5 Sheets-Sheet 1

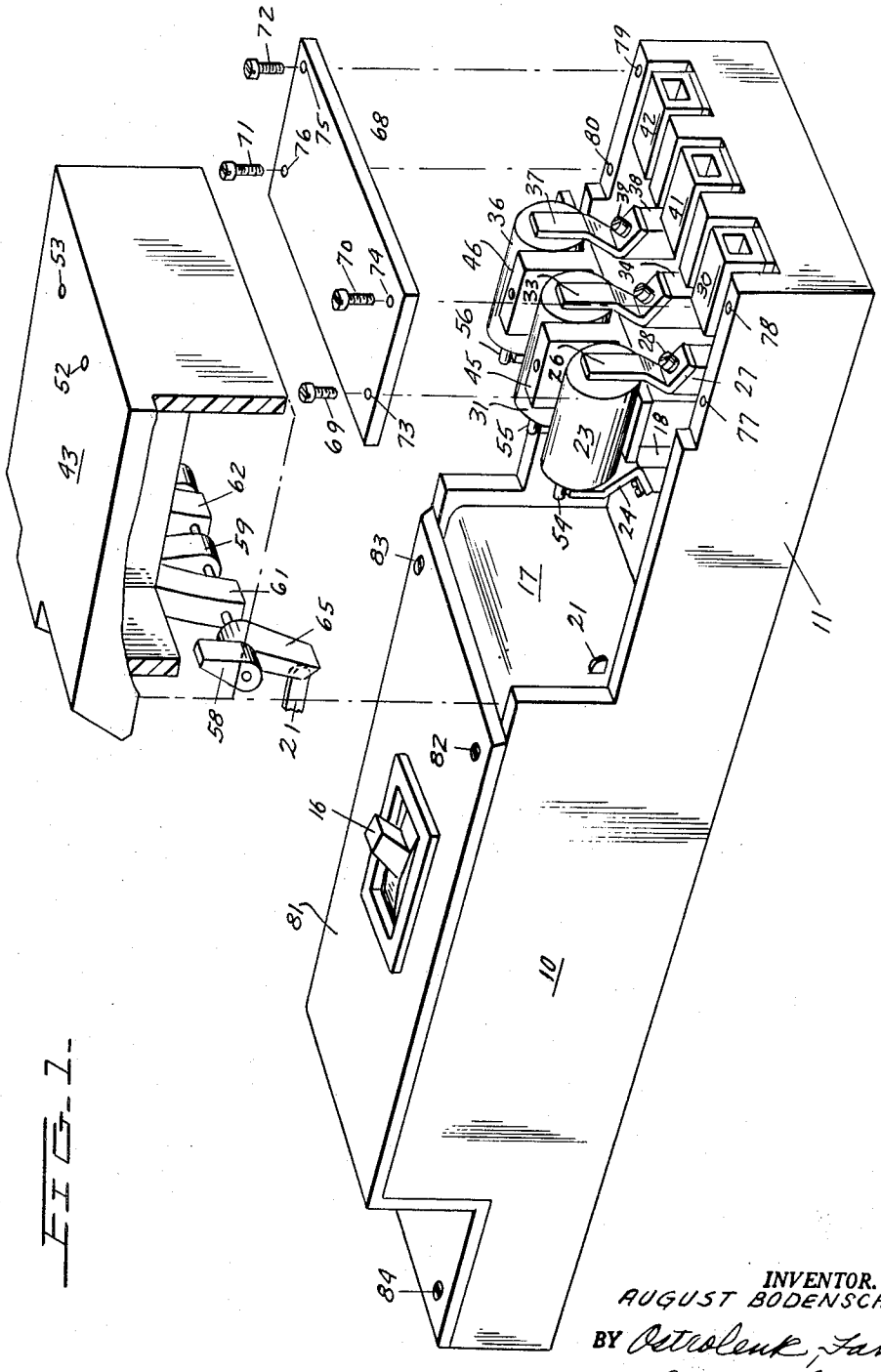


FIG. 1.

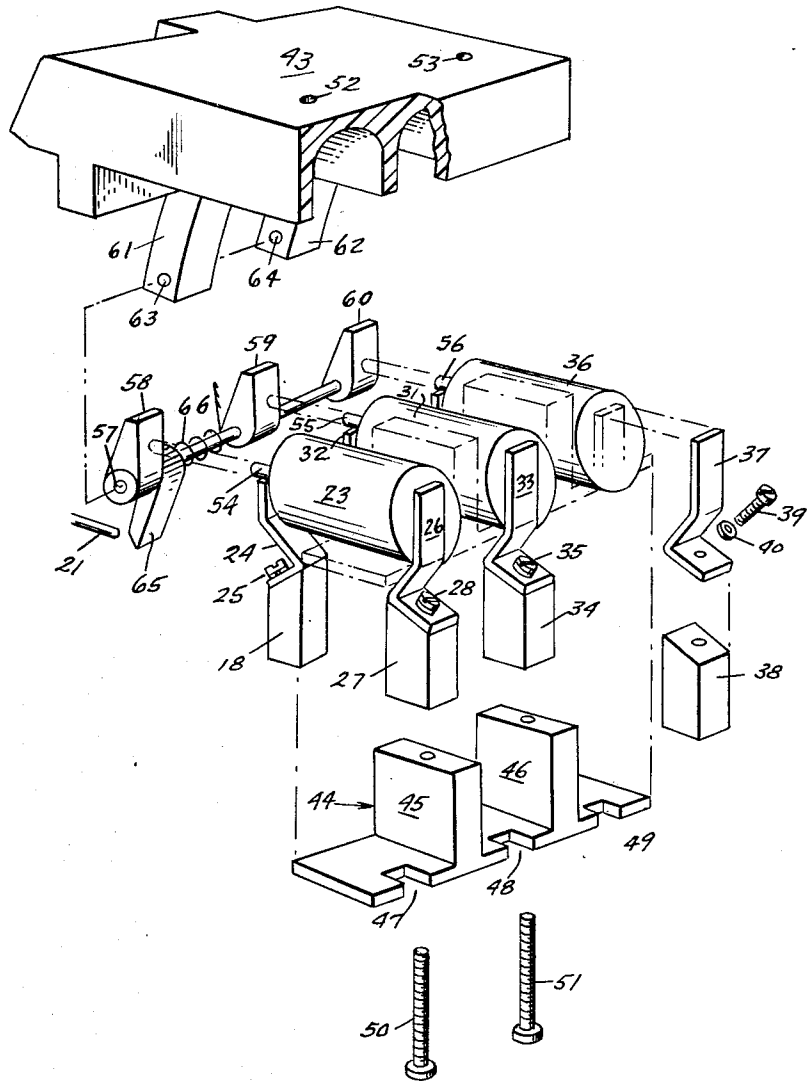
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BOLTED CONNECTION FOR CURRENT LIMITING FUSES

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FIG. 2.



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BOLTED CONNECTION FOR CURRENT LIMITING FUSES

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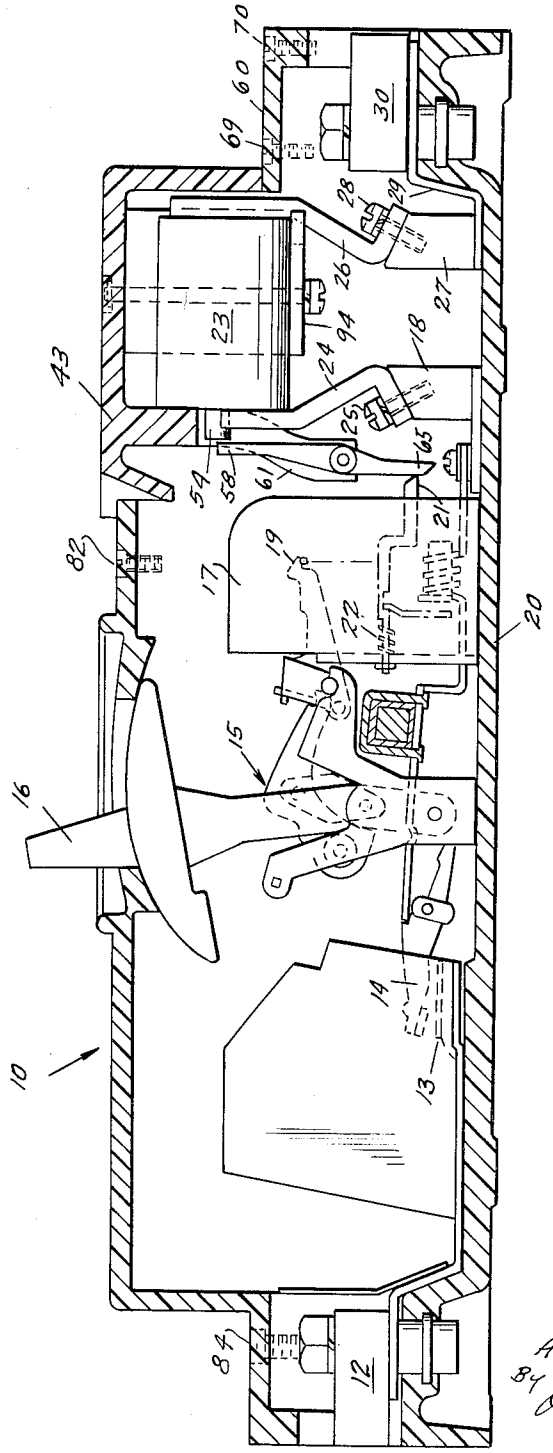


FIG. 3

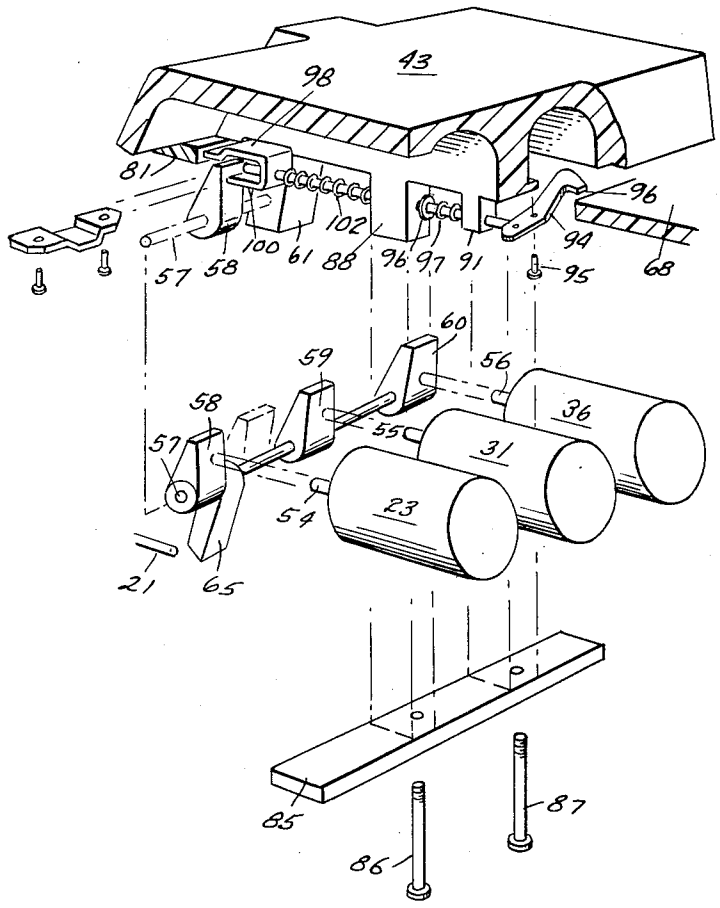
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BOLTED CONNECTION FOR CURRENT LIMITING FUSES

Filed Nov. 24, 1959 5 Sheets-Sheet 4

FIG. 4



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BOLTED CONNECTION FOR CURRENT LIMITING FUSES

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FIG. 5

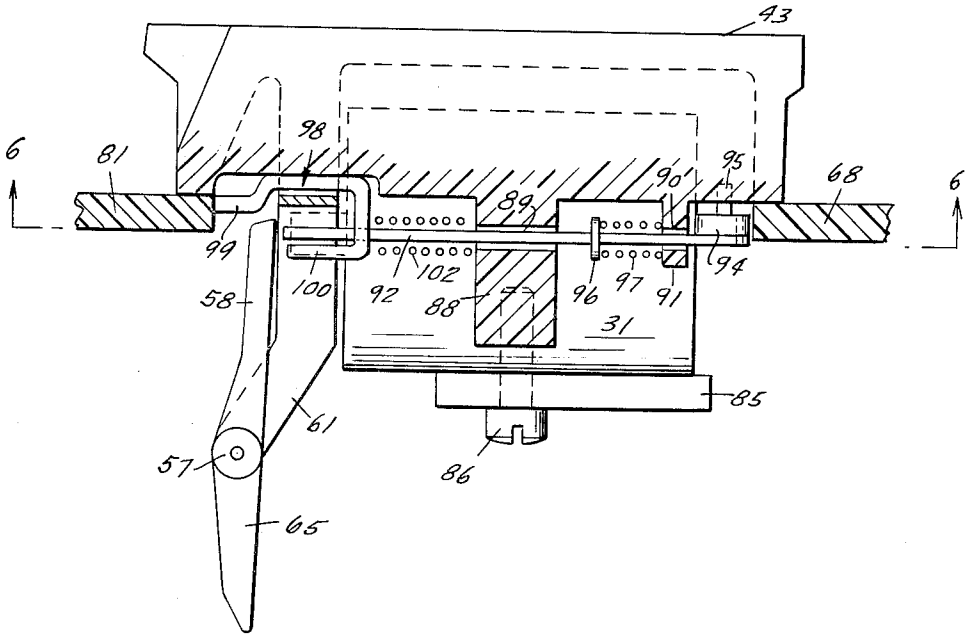
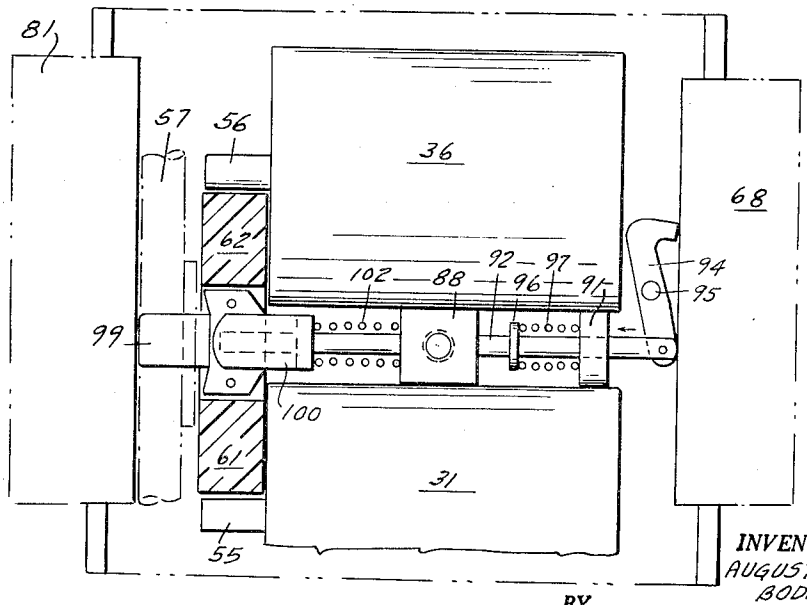


FIG. 6



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United States Patent Office 3,043,934 Patented July 10, 1962

3,043,934
BOLTED CONNECTION FOR CURRENT LIMITING FUSES

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Filed Nov. 24, 1959, Ser. No. 855,093
9 Claims. (Cl. 200—114)

This invention relates to circuit interrupters of the type having coordinated circuit breakers and current limiting fuses connected in series, and is more particularly related to a means for increasing the current rating of such a combined interrupter by providing a bolted electrical connection between the circuit breaker and the current limiting fuse while retaining all of the required mechanical and electrical coordination between the two units.

Circuit interrupters formed of electrically and mechanically coordinated circuit breakers and current limiting fuses are well known in the art, and are typically shown in copending application (C-590) Serial No. 622,042, filed November 14, 1956, now Patent No. 2,924,688 granted Feb. 9, 1960 in the name of William Harold Edmunds and assigned to the assignee of the present invention.

All of the efforts in this field have been substantially limited to relatively low current ratings which are below, for example, 800 amperes. The primary reason for this is that the connection between the current limiting fuses and the circuit breaker is through a tulip-clip type of connection, or similar easily releasable connection.

This is necessary, since it is desirable that the current limiting fuses be retained in a common housing, and since it is desirable that this common housing be removable with respect to the circuit breaker housing while providing interlocks between the two housings for causing circuit breaker operation responsive to removal of the current limiting fuse housing. However, when the two are connected the electrical connection occurs in the base of the circuit breaker which is obscured by the fuse housing. Thus, it was thought impossible to get appropriate tools into the area at which the connection was made, and, therefore, cooperating disconnects such as of the tulip-clip type were always used.

While this type of connection is highly desirable because of the inherent simplicity it provides in connecting the fuses in circuit breakers, it is not possible to cause this connection to be too tight, since it would then be almost impossible to mechanically pull the contacts apart or push them together. Therefore, the contact resistance in this type device is relatively high.

In a high current rating application, and because of this high contact resistance, a substantial amount of heat will be generated at the contacts. Furthermore, since these contacts are adjacent to the trip unit, this heat will be applied to the thermal trip elements, such as bimetal elements which operate the circuit breaker responsive to overload conditions. Therefore, it becomes substantially impossible to properly calibrate these thermal overload elements.

The concept of the present invention is to overcome these problems of excessive heat generation by replacing the previously used disconnect type contact with a bolted connection between the fuse terminals and the circuit breaker terminals. In order to permit this type of connection and yet retain the fuses in a common housing separable from the circuit breaker housing and still provide all of the desired interlocks between the two housings, I have made the circuit breaker covers adjacent the area at which the fuse housing is to be connected removable. The bolted connections between the fuse terminals and the circuit breaker terminals are then placed on a bias or angle whereby an operator will be able to connect the fuse housing and the fuse terminals to the circuit breaker terminals by bolt means while these circuit breaker housing portions are removed. Thereafter, the circuit breaker housing portions are easily connected in place to complete the circuit interrupter device unitary housing which may be the desired flat front type of construction. A novel interlock means is then connected between the removable portions of the circuit breaker housing and the circuit breaker trip unit so that the circuit breaker trips responsive to the removal of the removable portions; furthermore, the fuse housing is arranged to defeat the interlock when the housing portions are in position so that the circuit breaker cannot be closed unless the fuse housing is in position.

Accordingly, a primary object of this invention is to provide a circuit interrupter formed of a combined circuit breaker and current limiting fuse which is capable of operating on current ratings higher than has previously been thought possible.

Another object of this invention is to provide a novel circuit interrupter utilizing the circuit breaker and a current limiting fuse wherein the circuit breaker and current limiting fuse are connected together by a bolted connection.

Another object of this invention is to provide a mechanically and electrically coordinated circuit breaker and current limiting fuse wherein the circuit breaker and current limiting fuse have respective housings which are removably connected to one another by a bolted connection.

Still a further object of this invention is to provide a novel bolted connection for bolting current limiting fuses in series with a circuit breaker wherein the current limiting fuses are carried in their own housing, and access may be had to the bolted connection through removable panels in the circuit breaker housing.

Yet another object of this invention is to provide a novel coordinated assembly of a circuit breaker and current limiting fuses therefor, each within their respective housings, wherein the current limiting fuse housing is interlocked with the circuit breaker housing so that, responsive to the removal of circuit breaker housing portions to permit access to a bolted connection, there will be an automatic opening operation of the circuit breaker contacts.

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

FIGURE 1 shows a partially exploded perspective view of the circuit breaker housing and fuse housing which are connected together by a bolted connection in accordance with the present invention.

FIGURE 2 shows an exploded perspective view of the fuse housing of FIGURE 1 and the fuses contained therein.

FIGURE 3 is a side cross-sectional view of the combined circuit breaker and current limiting fuse assembly of FIGURE 1 when taken through one phase thereof.

FIGURE 4 is an exploded perspective view of the fuse housing proposed by the present invention showing a modified means for carrying the fuses within the housing, and particularly showing the novel interlock means for initiating operation of the circuit breaker responsive to removal of the circuit breaker housing portions to gain access to the bolted connection between the fuses and the circuit breaker.

FIGURE 5 is a cross-sectional view of a portion of the fuse housing of FIGURE 4 and particularly illustrates the manner in which the interlock means is connected.

FIGURE 6 is a partial cross-sectional view of FIG-

URE 5 when taken across the lines 6—6 of FIGURE 5.

Referring first to FIGURES 1 and 3, I have shown a circuit breaker in a first housing **10** that has an extended base **11** in much the same manner as described in the above noted copending application (C–590) Serial No. 622,042. As is best seen in FIGURE 3, the circuit breaker is comprised of a first terminal **12** which is electrically connected to a stationary contact **13**.

A movable contact **14** is movable into and out of engagement with contact **13** in the usual manner and under the influence of an operating mechanism of any desired type **15**. The operating mechanism **15**, in the usual manner, is manually operable by an operating handle **16** which extends through the top of the circuit breaker housing **10** to afford manual access thereto.

The current path then extends from the movable contact **14** as by the use of a pigtail or any other desired connecting means to the trip unit **17** which contains various trip elements, such as a thermal means which could use a bimetal which is directly heated, or indirectly heated, and a magnetic trip means which could include a solenoid operated mechanism, and the electrical connection thence extends to a circuit breaker terminal such as terminal **18** in FIGURE 3.

It will be apparent to those skilled in the art that FIGURE 3 shows only one phase. The same electrical path identified above for the circuit breaker will, of course, be duplicated for each of the other phases in a multiphase unit.

The aforementioned trip elements contained in trip housing **17** are also operable upon the operating mechanism **15** to cause operation of movable contact **14** under various types of electrical fault conditions. By way of example, where there is a light overload for a predetermined length of time, the thermal trip means which could include a bimetal element could be effective to remove a latch schematically illustrated as latch **19** in trip unit **17** of FIGURE 3 to cause operation of the trip unit.

In a like manner, energization of the magnetic trip means, which could include solenoid **20** in FIGURE 3, could also in some way remove a latch mechanism to cause subsequent operation of movable contact **14** under relatively low short circuit conditions.

In accordance with the presently accepted concepts of electrical and mechanical coordination of circuit breakers and current limiting fuses, a still further means for opening the circuit breaker contact is provided by way of a signal delivered by a current limiting fuse in series with one of the phases of the circuit breaker when that current limiting fuse operates under a severe fault condition. In FIGURE 3, as will be seen more fully hereinafter, this mechanical signal is delivered to a trip link **21** which extends from the trip unit **17**, and in some way is operatively connected to the latch mechanism included in operating mechanism **15**. For further details of this type of structure, reference is made to the aforementioned copending application (C–590) Serial No. 622,042, which illustrates typical connections which could be used here.

It is sufficient for purposes of the present invention to understand that the trip link **21** is normally biased outwardly by a biasing spring **22** (FIGURE 3) so that the tip of link **21** extends from the trip mechanism **17**, as shown in FIGURE 1. So long as the outward motion of link **21** or motion thereof to the right is restricted in some manner, the automatic tripping will not be achieved. It is only when link **21** is permitted to move to the right under the influence of spring **22** that automatic tripping will be effected.

Returning now to the electrical path through the phase shown in FIGURE 3, a current limiting fuse **23** has an extending terminal **24** which is bolted to terminal **18** by the bolt **25**. The path is then continued through the fuse elements within fuse **23** to its opposite terminal **26** which is then bolted to another terminal **27** by bolt **28** where terminal **27** is carried, as is terminal **18**, in the extended

base **11** of circuit breaker housing **10**. The electrical path then extends from terminal **27** over a conductor **29** to the circuit breaker terminal **30** of the phase shown in FIGURE 3.

Each of the remaining circuit breaker phases are terminated by fuses bolted thereto in the same manner as shown for the case of fuse **23** and terminals **18** and **27** in FIGURE 3. Thus, in FIGURES 1 and 2, the second phase includes a fuse **31** which has extending terminals **32** and **33** which are bolted to circuit breaker terminals **34** and another, not seen in the figures, where bolt **35** completes the connection between members **33** and **34**.

The third phase then includes fuse **36** which has extending conductors, such as conductor **37**, best shown in FIGURE 2 which extends downwardly to a terminal on the circuit breaker base, such as terminal **38**, and is bolted thereto, as best shown in FIGURE 2, by bolt **39** and, if desired, a pressure washer **40** (where each of the bolts may have this type of pressure washer associated therewith).

It will be noted particularly in FIGURE 1 that the ultimate circuit breaker terminals for the last two phases considered include terminals **41** and **42** whereby circuit breaker terminals **30**, **41** and **42** represent the terminals for the three-phase circuit interrupter, while a similar configuration of three terminals are provided at the other end of the interrupter, such as terminal **12** shown in FIGURE 3.

As previously described, it is desirable that each of the fuses **23**, **31** and **36** be contained within a housing which is separate and removable from the circuit interrupter housing. Accordingly, I provide a main housing body **43** of FIGURES 1, 2 and 3, which has channels in the base thereof which conform to the shape of the fuses **23**, **31** and **36**, so that the fuses are appropriately received and positioned within housing **43**.

The individual fuses are then retained with respect to housing **43** by a retaining bar **44** which has two extending sections **45** and **46** which fit between fuses **23** and **31**, and **31** and **36** respectively.

In addition, and to further aid in the positioning of the fuses, retaining bar **44** is provided with notches **47**, **48** and **49** which register with extending arms **26**, **33** and **37** of fuses **23**, **31** and **36** respectively in order to properly angularly position the fuses within housing **43**. The retaining bar **44** is then rigidly held in position with respect to housing **43** by bolts **50** and **51** which extend through cooperating openings in protrusions **45** and **46**, and register with cooperating openings, such as openings **52** and **53** respectively (FIGURES 1 and 2) in housing **43**.

As previously mentioned, it is necessary for the fuses to deliver some signal or indication of the fact of their operation to the trip unit **17**, and thus to the operating mechanism **15**, so that the operating mechanism will cause the opening of all phases of the circuit breaker contacts when any fuse operates. To this end, each of the fuses are provided with a typical striker pin, such as striker pins **54**, **55** and **56** for fuses **23**, **31** and **36** respectively. The striker pins are constructed in the well known manner, whereby they will be ejected when the fuse is operated.

An auxiliary tripper bar **57** is provided with projections **58**, **59** and **60** which are in registry with striker pins **54**, **55** and **56** respectively so that the auxiliary tripper bar **57** will be rotated when any of striker pins **54**, **55** or **56** is ejected. The auxiliary tripper bar **57** is carried from projecting legs **61** and **62** of housing **43** where legs **61** and **62** have apertures, such as apertures **63** and **64** respectively therein for receiving tripper bar **57** in the manner shown in FIGURES 1 and 3. Since the tripper bar is integrally carried by housing **43**, it will be apparent that the striker pins of the fuses, when assembled in the housing will inherently be properly aligned with extensions **58**, **59** and **60**.

The tripper bar **57** carries a further lower extending member **65** which is normally biased along with auxiliary

tripper bar 57, to rotate in a counterclockwise direction by a spring, such as spring 66 shown in FIGURE 2.

The extension 65, as best seen in FIGURE 3, engages the extending portion of trip link 21 and the biasing means, such as spring 66 which biases element 65 clockwise, is arranged to be stronger than spring 22 which biases trip link 21 to the right. Accordingly, trip link 21 will normally be held in its inactive position to the left. When, however, one of the fuses 23, 31 or 36 ejects its striker pin 54, 55 or 56 respectively, the striker pin will force auxiliary tripper bar 57 to rotate counterclockwise, and thus permit trip link 21 to move to the right under its biasing spring 22 to thereby cause automatic circuit breaker operation.

In providing a bolted connection between the fuses 23, 31 and 36 and their respective circuit breaker phases, it has been mentioned heretofore that applicant can now use the combined circuit interrupter for current ratings which have been excluded for this type of circuit interrupter. That is to say, since the connection between the circuit breaker terminal blocks such as block 18 and fuse terminal 24 are adjacent the trip unit 17, the heat generated under high current conditions through the relatively high resistance, easily removable disconnect, would make it substantially impossible to properly calibrate the thermal trip elements of trip unit 17. Furthermore, the excessive heats generated at the high resistance contact under very high currents (such as 800 amperes or more) could possibly cause a welding of the disconnect contacts.

By using a bolted connection, as shown in FIGURES 1, 2 and 3, the contact resistance may be substantially decreased, and, thus, the heat generated at the connection between the fuses and the circuit breaker is correspondingly decreased to a point at which it will exert very little influence on the trip unit calibration.

The problem, however, remains to be able to mount the fuses in the common housing 43, and yet be able to get a tool into the area of the bolted connection to make the bolted connection, since the housing 43 covers the connection.

In accordance with the present invention, I have found that I can make certain portions of the circuit breaker cover removable to provide access to the connection and yet still have an interlock between the circuit breaker housing and current limiting fuse housing which will cause operation of the circuit breaker when these housing portions are removed and the bolted terminals are exposed. The removable housing portions of the circuit breaker are best shown in FIGURES 1 and 3 wherein the right-hand end of circuit breaker housing 10 is provided with a removable panel section 68 which is bolted to the circuit breaker base 11 by screws, such as screws 69, 70, 71 and 72 which pass through apertures 73, 74, 75 and 76 respectively in the plate portion 68 and into threaded openings 77, 78, 79 and 80 in housing portion 11.

The removal of panel 68 will clearly expose bolts 28, 34 and 39 so that an operator may place appropriate tools on these bolts to connect and disconnect terminals 26, 33 and 37 to terminals 27, 34 and 38 respectively.

In order to reach the other bolted terminals, I have made the circuit breaker cover 81 removable from housing 10 by the removal of screws 82, 83, 84 and another screw adjacent to screw 84 which is not seen in FIGURE 1. Clearly, the removal of these four screws which pass through cover 81 and are received at tapped openings in housing 10 will permit the lifting off of cover 81 to thus expose terminals, such as fuse terminal 24 and circuit breaker 18, so that the bolted connections may be operated upon. If desired, the complete cover 81 need not be removable for this purpose, but only a small cover portion similar to panel 68 could be utilized.

In operation, the clamping screws which retain the removable circuit breaker portions in position are removed and the fuse housing 43 and the fuses contained therein are then placed in appropriate position on base 11, and the bolted connection is made. Thereafter, panel 68 and cover 81 are slipped into position and bolted to the circuit breaker housing 10. In order to defeat the connection, panel 68 and cover 81 are first removed, and the fuse terminals may thereafter be disconnected.

With this type of conection, it was not thought possible to follow the prior art teachings of providing some type of interlock between the circuit breaker housing and fuse housing whereby removal of the fuse housing could cause the operation of the circuit breaker contacts so that operators working on the fuses will not be exposed to a live circuit. For this reason, it has been thought impossible to use a bolted connection. I have, however, found a novel structure whereby this required interlock may be provided between the removable cover portions or panel portions of the circuit breaker and the fuse housing so that the same protective results are achieved.

The novel interlock of the invention may be best understood from FIGURES 4, 5 and 6 which show the fuse housing in connection with a portion of panel 68 and a portion of cover 81. In FIGURES 4, 5 and 6 numerals identifying components similar to those shown in FIGURES 1, 2 and 3 are given like identifying numerals.

It is to be first noted with reference to FIGURES 4, 5 and 6 that I have shown an alternate method by which the individual circuit breaker fuses 23, 31 and 36 can be assembled with respect to fuse housing 43. Namely, a flat retaining bar 85 is provided instead of the retaining bar 44 of FIGURES 1, 2 and 3 which has extending fingers 45 and 46. Retaining screws 86 and 87 extend through retaining bar 85 and into two downwardly projecting portions of housing 43, such as projecting portion 88 which lies between fuses 23 and 31, and a similar projection (not shown in the drawings) which lies between fuses 31 and 36. In all other respects, the fuses are retained with respect to housing 43 in the same manner as heretofore described wherein housing 43 provides a seating surface which conforms to the shape of the fuses to thus automatically seat and position the fuses.

Referring now to the interlock structure, projecting leg 88 is provided with an aperture 89 which is in alignment with aperture 90 carried by an extending leg 91 of housing 43. Apertures 89 and 90 receive an interlock rod or plunger 92 which is pivotally connected to a hook-shaped member 94 at its right-hand end in the manner shown in FIGURE 4. Hook-shaped member 94 is pivotally mounted to housing 43, as by a pin 95, and has a latching end 96 positioned adjacent the end of panel 68.

The left-hand end of the interlock rod 92 is positioned adjacent projection 58, as best seen in FIGURES 4 and 5. The interlock shaft 92 is provided with a collar 96 which receives a compression spring 97 which is compressed between collar 96 and extension 91. Spring 97 is effective to drive rod or plunger 92 to the left when hook-shaped member 95 is released whereby the rod will engage extension 58 to operate auxiliary tripper bar 57.

Accordingly, the circuit breaker is provided with an interlock for causing circuit breaker operation when cover portion 68 is removed to permit hook-shaped member 96 to rotate under the influence of spring 97 which, at the same time, drives rod 92 to the left.

A second interlocking means is provided for cover 81, and comprises the U-shaped member or plunger 98 which has an upper leg 99 adjacent cover 81 and a lower leg 100 which is adjacent extension 58. The U-shaped member 98 is carried with respect to housing 43 in any desired manner, as by providing a slot 101, and the base of the U-shaped member 98 has a large aperture therein for permitting rod 92 to pass therethrough without it being constrained by member 98.

A biasing spring 102 is then provided between the base of U-shaped member 98 and the left-hand side of extending leg 88 to normally bias member 98 to the left,

and, thus, bring leg 99 into engagement with the edge of housing portion 81.

Accordingly, if one were to remove cover portion 81 to provide access to the bolted connection, the U-shaped member would move to the left under the influence of spring 102 so that lower leg 100 would engage extension 58 and cause operation of the auxiliary tripper bar 57.

Accordingly, the circuit breaker will now be operated when either of cover portions 68 or 81 are removed to gain access to the bolted connection.

It is to be noted that when the cover portions 68 and 81 are in position, the fuse housing operates to defeat the interlock since, if the fuse housing is removed, interlock rod 21 of the trip unit will be ejected so that the circuit breaker cannot be closed when the fuse housing is removed.

Although I have described preferred embodiments of my novel invention, many variations and modifications will now be obvious to those skilled in the art, and I prefer therefore to be limited not by the specific disclosure herein but only by the appended claims.

I claim:

1. In combination: a fuse and a circuit breaker; said circuit breaker being contained in a first housing; said fuse being contained in a second housing and secured thereto by fastening means; said fuse having a first and second terminal; said first housing having a first and second terminal for electrically receiving said first and second terminal of said fuse respectively to electrically connect said current limiting fuse in series with said circuit breaker; said first terminal of said first housing being electrically connected to said circuit breaker; a bolt means separate from said fastening means; said first terminal of said first housing being electrically connected to said first terminal of said fuse by said bolt means; said second housing normally enclosing the area including said bolted connection of said terminals; said first housing having at least a portion thereof removable from said first housing; said removable portion permitting access to said bolted connection of said terminals.

2. In combination: a fuse and a circuit breaker; said circuit breaker being contained in a first housing; said fuse being contained in a second housing and secured thereto by fastening means; said fuse having a first and second terminal; said first housing having a first and second terminal for electrically receiving said first and second terminal of said fuse respectively to electrically connect said current limiting fuse in series with said circuit breaker; said first terminal of said first housing being electrically connected to said circuit breaker; a first and second bolt means separate from said fastening means; said first terminal of said first housing being electrically connected to said first terminal of said fuse by said first bolt means; said second terminal of said first housing being connected to said second terminal of said fuse by said second bolt means; said second housing normally enclosing the area including said bolted connection of said terminals; said first housing having at least a portion thereof removable from said first housing; said removable portion permitting access to said bolted connection of said terminals.

3. In combination: a fuse and a circuit breaker; said circuit breaker being contained in a first housing; said fuse being contained in a second housing and secured thereto by fastening means; said fuse having a first and second terminal; said first housing having a first and second terminal for electrically receiving said first and second terminal of said fuse respectively to electrically connect said current limiting fuse in series with said circuit breaker; said first terminal of said first housing being electrically connected to said circuit breaker; a bolt means separate from said fastening means; said first terminal of said first housing being electrically connected to said first terminal of said fuse by said bolt means; said second housing normally enclosing the area including said bolted connection of said terminals; said terminals being positioned on a bias whereby said first housing is of reduced length; said first housing having at least a portion thereof removable from said first housing; said removable portion permitting access to said bolted connection of said terminals; and an interlock means; said interlock means being connected between said removable portion of said first housing and said circuit breaker; said interlock means being defeated by said second housing when said second housing is in position with respect to said first housing; said interlock means opening said circuit breaker responsive to removal of said removable portion of said first housing and preventing the closing of said circuit breaker when said second housing is not in position with respect to said first housing.

4. In combination: a fuse and a circuit breaker; said circuit breaker being contained in a first housing; said fuse being contained in a second housing and secured thereto by fastening means; said fuse having a first and second terminal; said first housing having a first and second terminal for electrically receiving said first and second terminal of said fuse respectively to electrically connect said current limiting fuse in series with said circuit breaker; said first terminal of said first housing being electrically connected to said circuit breaker; a first and second bolt means separate from said fastening means; said first terminal of said first housing being electrically connected to said first terminal of said fuse by said first bolt means; said second terminal of said first housing being connected to said second terminal of said fuse by said second bolt means; said second housing normally enclosing the area including said first and second bolted connection of said terminals; said first housing having a first and second removable portion adjacent said first and second bolted connection respectively for permitting access to said first and second bolted connection respectively.

5. In combination: a fuse and a circuit breaker; said circuit breaker being contained in a first housing; said fuse being contained in a second housing and secured thereto by fastening means; said fuse having a first and second terminal; said first housing having a first and second terminal for electrically receiving said first and second terminal of said fuse respectively to electrically connect said current limiting fuse in series with said circuit breaker; said first terminal of said first housing being electrically connected to said circuit breaker; a first and second bolt means separate from said fastening means; said first terminal of said first housing being electrically connected to said first terminal of said fuse by said first bolt means; said second terminal of said first housing being connected to said second terminal of said fuse by said second bolt means; said second housing normally enclosing the area including said first and second bolted connection of said terminals; said first housing having a first and second removable portion adjacent said first and second bolted connection respectively for permitting access to said first and second bolted connection respectively; and an interlock means; said interlock means being connected between said first and second removable portions of said first housing and said circuit breaker; said interlock means being defeated by said second housing when said second housing is in position with respect to said first housing; said interlock means opening said circuit breaker responsive to removal of either of said first or second removable portions of said first housing; said interlock means preventing the closing of said circuit breaker when said second housing is not in position with respect to said first housing.

6. A multiphase circuit interrupter comprising the series connection of a multiphase circuit breaker and a respective current limiting fuse for each phase of said multiphase circuit breaker; said multiphase circuit breaker having a pair of cooperable contacts for each respective phase and a trip unit for controlling the operation of said cooperable contacts between an engaged and disengaged position; said multiphase circuit breaker being contained with-

in a first housing, each of said current limiting fuses being contained within a second housing and secured thereto by fastening means; each of said circuit breaker phases terminating in a respective terminal; each of said fuses having a terminal to be electrically and mechanically connected to a respective terminal terminating said respective circuit breaker phase; a plurality of bolt means separate from said fastening means; said respective terminals of said circuit breaker phases and said current limiting fuses being connected by said bolt means; said current limiting fuse housing enclosing the area including said bolted connections; said circuit breaker housing having a removable portion adjacent said bolted connections to permit access to said bolted connections.

7. A multiphase circuit interrupter comprising the series connection of a multiphase circuit breaker and a respective current limiting fuse for each phase of said multiphase circuit breaker; said multiphase circuit breaker having a pair of cooperable contacts for each respective phase and a trip unit for controlling the operation of said cooperable contacts between an engaged and disengaged position; said multiphase circuit breaker being contained within a first housing; each of said current limiting fuses being contained within a second housing and secured thereto by fastening means; each of said circuit breaker phases terminating in a respective terminal; each of said fuses having a terminal to be electrically and mechanically connected to a respective terminal terminating said respective circuit breaker phase; a plurality of bolt means separate from said fastening means; said respective terminals of said circuit breaker phases and said current limiting fuses being connected by said bolt means; said current limiting fuse housing enclosing the area including said bolted connections; said circuit breaker housing having a removable portion adjacent said bolted connections to permit access to said bolted connections; and an interlock means; said interlock means being connected between said removable portion of said circuit breaker housing and said trip unit of said circuit breaker; said interlock means being defeated by said current limiting fuse housing when said current limiting fuse housing is in position with respect to said circuit breaker housing; said interlock means opening said circuit breaker cooperating contacts responsive to removal of said removable portion of said circuit breaker housing and preventing the closing of said circuit breaker when said current limiting fuse housing is not in position with respect to said circuit breaker housing.

8. A current limiting fuse housing for carrying a plurality of current limiting fuses; each of said current limiting fuses having a striker pin ejectable therefrom responsive to operation of any of said current limiting fuses; an auxiliary tripper bar; said auxiliary tripper bar being carried by said current limiting fuse housing and being rotatable with respect to said housing; said auxiliary tripper bar having a plurality of extensions, each aligned with the said striker pin of a respective current limiting fuse whereby said auxiliary tripper bar is rotated in a first direction by the ejected striker pin of any of said current limiting fuses when any of said current limiting fuses are operated; a member separate from said fuses normally positioned adjacent a portion of said current limiting fuse housing; an axially movable plunger separate from said fuses carried by said current limiting fuse housing; one end of said plunger being positioned adjacent one of said plurality of extensions; a biasing means for said plunger for biasing said plunger toward said one of said plurality of extensions; said plunger being restrained against movement by said biasing means by said member; removal of said member from its said adjacent position permitting said plunger to rotate said auxiliary tripper bar in a first direction.

9. A current limiting fuse housing for carrying a plurality of current limiting fuses; each of said current limiting fuses having a striker pin ejectable therefrom responsive to operation of any of said current limiting fuses; an auxiliary tripper bar; said auxiliary tripper bar being carried by said current limiting fuse housing and being rotatable with respect to said housing; said auxiliary tripper bar having a plurality of extensions, each aligned with the said striker pin of a respective current limiting fuse whereby said auxiliary tripper bar is rotated in a first rotation by the ejected striker pin of any of said current limiting fuses when any of said current limiting fuses are operated; a first member and a second member separate from said fuses normally positioned adjacent a respective first and second portion of said current limiting fuse housing at opposite ends thereof; a first and a second plunger positioned adjacent at least one of said plurality of extensions; a biasing means for each of said first and second plungers respectively for biasing said plungers toward said at least one of said plurality of extensions; said first plunger being restrained against movement by said biasing means by said first member; said second plunger being restrained against movement by said biasing means by said second member; removal of either of said first or second members from their said adjacent positions permitting said plunger to rotate said auxiliary tripper bar in said first direction.

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