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KEYED MOUNTING MEANS FOR CIRCUIT BREAKERS

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2 Sheets-Sheet 1

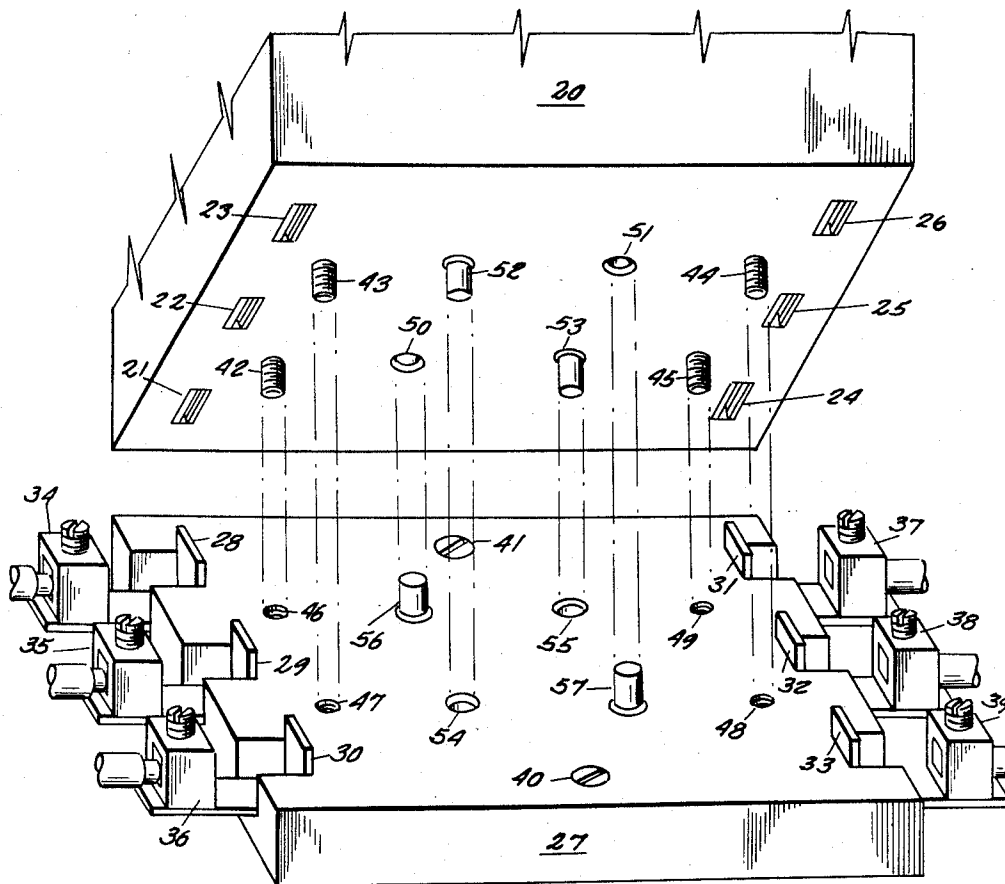


FIG. 1

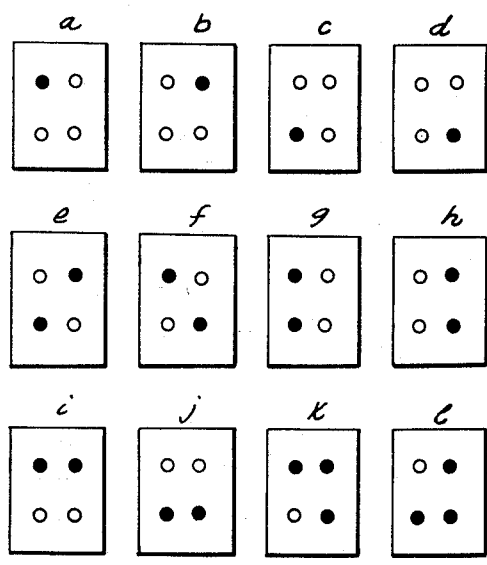


FIG. 3

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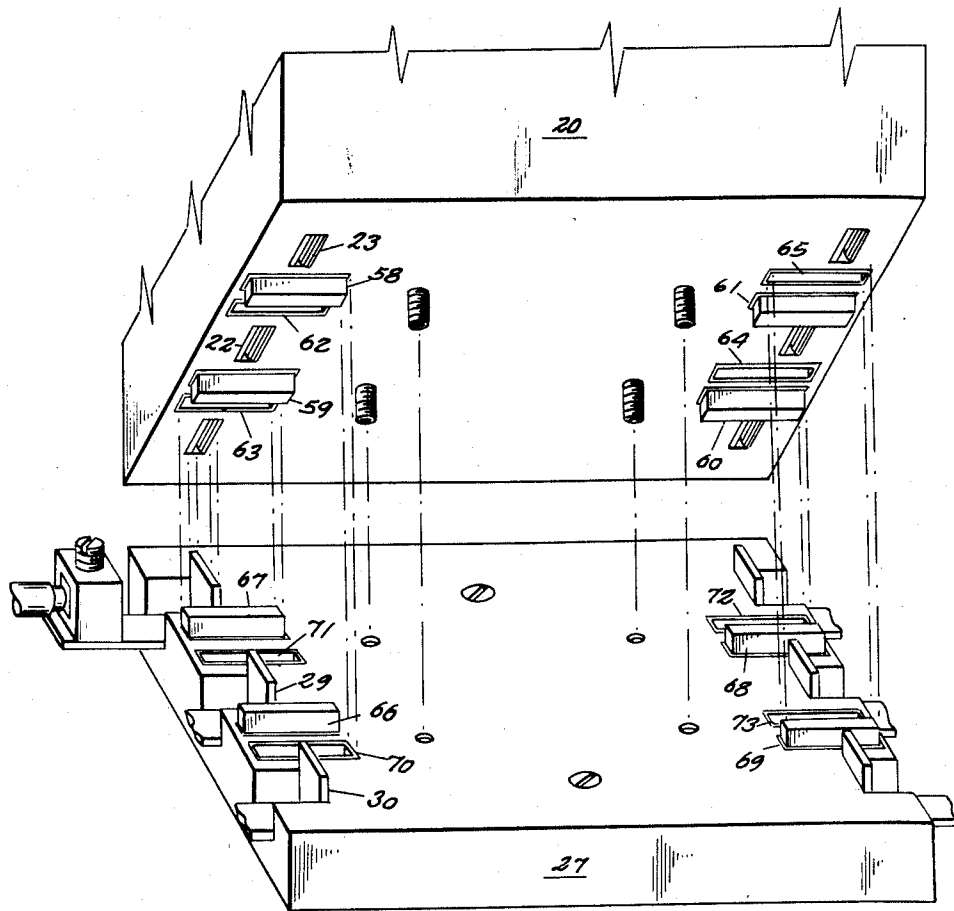


FIG. 2.

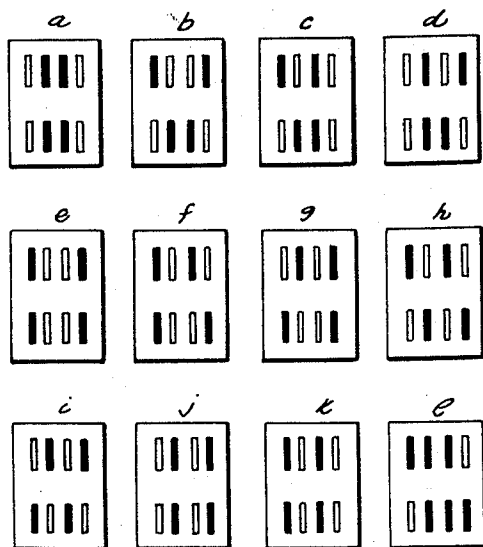


FIG. 4.

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KEYED MOUNTING MEANS FOR CIRCUIT BREAKERS

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1 Claim. (Cl. 317-119)

My invention relates to a means of keying circuit breakers to their mounting blocks and is more specifically directed to means for keying plug-in type circuit breakers to their corresponding panel board or switch board in such a manner that circuit breakers may not be connected to the panel board terminals when the rating of the circuit breaker is incorrect.

Plug-in type circuit breakers which are adapted to be plugged-in to a panel board or switch board or any desired type of mounting base are well known in the art and provide the advantage of allowing all wiring to be done in the mounting base with the circuit breaker being inserted or replaced in the absence of exposed wiring. There is, however, a distinct disadvantage of the possibility of connecting a circuit breaker of the wrong rating to a pair of cooperating terminals supported by the mounting base. By way of example, a circuit breaker having a rating greater than the capacity of the wire or bus of the mounting base may be used to thereby expose this wiring or bus to severe overloads.

The principle of my invention is to prevent plug-in type circuit breakers of a rating other than that originally intended from being inserted into the line, by providing a keying means such as a protrusion for the circuit breaker and a cooperating keying means such as a depression for the mounting means whereby these two keying means cooperate to allow connection between the terminals of the circuit breaker and the mounting means only when the ratings are of the correct values.

The keying means of my invention may consist of a plurality of protruding insulating members, either molded or permanently cemented into either or both of the mounting means and the circuit breaker which will match corresponding depressions in the mounting means and circuit breaker. These protrusions and matched openings may be of any desired shape or size and so arranged as to prevent electrical connection between the circuit breaker of a first rating to a mounting means of a rating different from that of the circuit breaker.

A second feature which is offered by my novel keying means is that the circuit breaker, when of the proper rating, is connected to its mounting means, the keying means will automatically position the circuit breaker terminals for correct insertion. Hence the circuit breaker terminals by being guided as described above are protected from damage due to misalignment.

Still another feature offered by my novel invention is that the keying means of the protruding type may be positioned between electrical terminals of opposite polarity on both the circuit breaker and its mounting means.

This type of construction then would form barriers between the terminals, thus increasing the surface creepage distance between the terminals of opposite polarity.

Accordingly, a primary object of my invention is to provide a keying means for assuring that a circuit breaker of proper rating is connected to its cooperating mounting block.

Another object of my invention is to provide a keying

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means for plug-in type circuit breakers and their cooperating mounting means which is so constructed as to prevent connection of the circuit breaker to its mounting means when the keying means of the circuit breaker and the mounting means are not dimensioned to cooperate with one another.

Still another object of my invention is to provide a keying means to allow connection between a circuit breaker and its mounting means only when the circuit breaker is of the proper rating, this keying means serving the further function of guiding and positioning the circuit breaker for correct insertion with respect to its cooperating mounting means.

A further object of my invention is to provide a keying means for circuit breakers and their associated mounting blocks which is so constructed as to form barriers between terminals of opposite polarity for both the circuit breaker terminals and the mounting block terminals to thereby increase surface creepage distances between these terminals.

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 a first embodiment of my novel invention.

Figure 2 shows a second embodiment of my novel invention.

Figure 3 shows an arrangement of the keying means of my invention which could be applied to a series of cooperating circuit breaker and mounting block ratings for the keying means of the type shown in Figure 1.

Figure 4 is similar to Figure 3 and shows the series of arrangements for a keying means of the type shown in Figure 2.

Referring now to Figure 1, it is seen that the circuit breaker 20 is provided with the three-phase plug-in type terminals 21, 22, and 23 which may be connectible to the line side of a circuit and plug-in terminals 24, 25 and 26 which may be connectible to the load side of an electrical circuit.

A mounting means 27 is then provided to mount the circuit breaker 20 by providing the disconnect contacts or terminals 28, 29 and 30 for cooperation with contacts 21, 22 and 23 of the circuit breaker 20 and the contacts or terminals 31, 32 and 33 for cooperation with contacts 24, 25 and 26 of circuit breaker 20.

It is to be noted that while the mounting means 27 is shown in the embodiment of Figure 1 as being a mounting block, this could have been shown as a panel board or switch board or any desired mounting means on which a plug-in type circuit breaker such as the circuit breaker 20 may be connected.

Each of the disconnect contacts or terminals 28, 29 and 30 are then seen to be connectible to the terminal means 34, 35 and 36. Similarly, terminals 31, 32 and 33 are connected to the terminal means 37, 38 and 39 respectively.

The mounting means 27 which in itself may be mounted in any desirable manner by means of the screws 40 and 41, is connected to the circuit breaker 20 by means of the circuit breaker mounting screws 42, 43, 44 and 45 which cooperate with apertures 46, 47, 48 and 49 respectively of the mounting block 27.

My novel keying means may now be seen as comprising the depressions 50 and 51 and protrusions 52 and 53 in the circuit breaker 20 whereas the keying means for the mounting means is comprised of depressions 54 and 55 and protrusions 56 and 57. Clearly the keying is accomplished by the cooperation of depression 50 and protrusion 56, depression 54 and protrusion 52, depression 55 and protrusion 53, and depression 51 and protrusion 57.

Hence it is now clear that if one selects a circuit breaker for cooperation with the mounting block 27, that this circuit breaker in order to be connectible to the mounting block must have depressions that will cooperate with the protrusions 56 and 57. If, then, only the circuit breakers which have a rating to allow them to cooperate with the rating of a particular mounting block such as 27 are provided with these depressions 50 and 51, it is seen that the connection of a circuit breaker having a rating greater than that of the terminal block may not be made.

Figure 3 schematically illustrates an arrangement which may be applied to the type keying system shown in Figure 1. These arrangements are schematically illustrated in arrangements *a* through *l* in which the solid shading indicates a protrusion in the block and a mating opening in the circuit breaker whereas the unshaded circles indicate a protrusion in the circuit breaker and a mating opening in the block.

By way of example, Figures 3*a* through 3*d* would indicate that the circuit breaker has three protrusions mating with three cooperating openings in the mounting means and the block has one protrusion mating with a cooperating opening in the circuit breaker. Each of Figures 3*a* through 3*d* differ from one another only in the positioning of the block protrusion and its cooperating mating opening in the circuit breaker.

Figures 3*e* through 3*j* show an arrangement whereby the circuit breaker has two protrusions while its mounting block has two openings to cooperate with these protrusions and the mounting block is further provided with two protrusions which cooperate with two mating openings in the circuit breaker.

Figures 3*k* and 3*l* show a still further arrangement wherein the mounting block is provided with three protrusions and one opening while the circuit breaker is provided with three openings and one protrusion positioned to cooperate with the openings and protrusions of the mounting block.

In the arrangements of Figure 3, it is seen that a series of sixteen ratings may be keyed in accordance with my novel invention so as to prevent the connection between a circuit breaker such as circuit breaker 20, Figure 1, and its mounting means such as the mounting means 27, Figure 1, when the circuit breaker is improperly rated. Clearly by increasing the number of cooperating protrusions from four to five, or any other larger number, a vastly increased range of ratings could be covered.

Furthermore, while I have shown my novel keying means as being comprised of projections and cooperating depressions, I could have shown my keying means as being comprised of protrusions differing from one another in shape or in diameter.

A further embodiment of my invention is seen in conjunction with Figure 2 in which components corresponding to the components of Figure 1 have been given similar identifying numerals.

Figure 2 differs from Figure 1, however, in the utilization of a keying means comprising projections 53, 59, 60 and 61, and depressions 62, 63, 64 and 65 in the circuit breaker 20 and projections 66, 67, 68 and 69 and depressions 70, 71, 72 and 73 in the mounting block or mounting means 27. In this case, it is seen that the protrusions 53 through 61 of the circuit breaker 20 cooperate with depressions 70 through 73 of the mounting means 27 while protrusions 66 through 69 of the mounting means 27 cooperate with depressions 62 through 65 of the circuit breaker 20.

In this construction it is seen that the protrusions and their cooperating depressions are positioned between the various terminals of the circuit breaker 20 and its mounting means 27. By way of example, protrusion 53 which cooperates with depression 70 and protrusion 66 which cooperates with depression 62 are positioned between the cooperating terminals 23 and 30 and the cooperating

terminals 22 and 29. Hence, the surface creepage distance between the terminals 29 and 30 of the mounting block 27 is appreciably increased to thereby allow a safer operating condition to proceed. The same is true for each pair of terminals in the system.

Figure 4 shows a system for the type keying construction shown in Figure 2 whereby a range of circuit breaker and mounting means ratings may be coordinated. This system which proceeds in a manner similar to that of Figure 3 shows in Figure 4*a* that the four centrally positioned keying members are constructed to be protrusions in the mounting block and depressions in the circuit breaker while the external keying members are protrusions in the circuit breaker with mating openings in the mounting block.

By way of example, Figure 4*a* would indicate that keying members 59, 62, 64 and 61 of the circuit breaker 20 of Figure 2 would be depressions while keying members 66, 71, 68 and 73 of the mounting means 27 would be protrusions. Similarly, keying means 63, 58, 65 and 60 of the circuit breaker 20 are indicated in Figure 4*a* as being protrusions while keying means 70, 67, 72 and 69 of the mounting means 27 are openings or depressions.

An analysis of each of the possibilities shown in Figures 4*b* through 4*l* would proceed in the same manner as has been set forth above in connection with Figure 4*a*.

It is now clear that in the event of a mismatch or an attempt to insert a circuit breaker such as circuit breaker 20 into a mounting means such as mounting means 27 when the circuit breaker 20 is of a higher rating than that of its cooperating mounting means, that electrical connection will be impossible since in this case, a protrusion of the circuit breaker will be aligned with a protrusion of the mounting means to thereby defeat electrical connection between these two devices.

It is to be further noted in conjunction with Figure 4 that each of the embodiments set forth therein still retains the advantage of providing an appreciably increased surface creepage path between terminals of different potentials in the mounting block.

In each of the embodiments of Figures 1 and 2, a further advantage afforded by my novel keying means may now be understood since, as well as providing a mismatch between the ratings of the circuit breaker and the mounting block, a guiding function is also served by the keying means. That is to say, in the embodiment of Figure 1, the cooperating protrusions and depressions in the circuit breaker 20 and its mounting means 27 automatically position the terminals such as terminals 21 through 26 of circuit breaker 20 with respect to their cooperating terminals 28 through 33 of the mounting means 27 prior to contact engagement.

Similarly, in the case of Figure 2, the protrusions and depressions of the circuit breaker 20 when properly positioned with respect to protrusions and depressions of mounting means 27 automatically position the circuit breaker terminals with respect to the terminals of the mounting means.

Hence by affording a guide for connection between the various terminals, the connection between the circuit breaker and its associated panel board is simplified for the operator and the possibility of damage to the terminals due to misalignment thereof is avoided.

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

I claim:

A plug-in type circuit breaker and a mounting means therefor; a set of load and a set of line terminals for each of said circuit breaker and said mounting means; each of said sets comprising at least three terminals; said circuit breaker terminals being removably engaged

with said mounting means terminals; said mounting means having a plurality of protrusions extending into recesses in said circuit breaker and said circuit breaker having protrusions extending into recesses in said mounting means; said circuit breaker protrusions and depressions being operatively positioned whereby said circuit breaker can only be mounted to a mounting means of predetermined ratings; said mounting means protrusions and depressions being operatively positioned to permit the mounting only of circuit breakers of predetermined ratings; each two adjacent ones of said terminals having an individual one of said protrusions interposed therebetween; said protrusions constructed to form barriers to withstand potentials existing between adjacent terminals; said protrusions and depressions cooperating to provide increased creepage distances between adjacent terminals.

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nals; said protrusions and depressions cooperating to provide increased creepage distances between adjacent terminals.

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