ADAPTATION MEANS FOR PANEL BOARDS HAVING LOW CAPACITY TERMINALS

William M. Scott, Jr., Brya Mawr, Pa., assignor to I-T-E Circuit Breaker Company, Philadelphia, Pa., a corporation of Pennsylvania

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My invention relates to a novel construction for relatively high capacity molded case circuit breakers to allow them to be connected to relatively low capacity panel boards.

At the present time panel boards are constructed as may be seen in U.S. Patent No. 2,737,613, issued March 6, 1956, to Marvin A. Morris and entitled Panel Board Terminal Mounting Blocks and assigned to the assignee of the instant invention, consisting of a pair of rows of terminals in alignment with the direction of the bus bars. By way of example, in the longitudinal direction, the terminals may be at 1/4 inch centers which would be the distance between the poles of certain low capacity molded case circuit breakers. Furthermore, the terminal board could be designed for approximately one row of terminals in both dimension and capacity, the panel board is designed only for low capacity breakers and is not adaptable for certain standard high capacity molded case breakers, such as a circuit breaker having a 225 ampere capacity.

My invention is directed to the construction of a novel adaptation means for high capacity molded case circuit breakers so that they can be mounted on the so-called low capacity panel boards.

The principle of my invention is to construct the terminals of the high capacity circuit breaker so that the terminal of each circuit breaker phase will be connectable to at least two panel board terminals of identical phase. Therefore, the net current capacity of the two panel board terminals (or any desired number of panel board terminals, depending upon the current rating of the larger circuit breaker) will be doubled to meet the current rating of the circuit breaker.

This novel adaptation means could be an integral part of the relatively high capacity circuit breaker or, if desired, could be a separate adapting unit which is fastened to a standard circuit breaker when it is to be mounted on the panel board.

Accordingly, the primary object of my invention is to provide a novel adapting means for allowing a mounting of relatively high capacity molded case circuit breakers on a relatively low capacity panel board.

Another object of my invention is to adapt the terminals of relatively high capacity molded case circuit breakers so that each circuit breaker terminal will be connectable to more than one cooperating terminal on the low capacity panel board whereby the net capacity of the terminals will at least equal the current rating of the circuit breaker.

Another object of my invention is to provide a simple and economical adapting means for allowing the connection of a relatively high capacity circuit breaker to a panel board having relatively low capacity terminals.

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

FIGURE 1 shows a relatively low capacity panel board connected to cooperating circuit breakers of relatively low capacity, as is the usual practice in the art.

FIGURE 2 shows the manner in which the panel board terminals of FIGURE 1 are connected to the panel board buses.

FIGURE 3 is a front cross-sectional view of one of the circuit breakers of FIGURE 1 when connected to its cooperating panel board terminals.

FIGURE 4 shows a first embodiment of my novel invention wherein a relatively high capacity molded case circuit breaker may be connected to the panel board of FIGURE 1 which is a relatively low capacity panel board.

FIGURE 5 shows a front cross-sectional view of the circuit breaker of FIGURE 4 when connected to its cooperating panel board terminals.

FIGURE 6 is a cross-sectional view of FIGURE 5 taken across the lines 6—6.

FIGURE 7 shows a top view of a second embodiment of my novel invention.

FIGURE 8 shows a top view of still another embodiment of my novel invention.

Referring now to FIGURE 1, a panel board which may be of the type set forth in U.S. Patent No. 2,737,613, issued March 6, 1956, and assigned to the assignee of the instant invention, is comprised of a support member 10 which contains buses A, B and C which represent a three phase energizing circuit. Each of buses A, B and C have terminal members electrically connected thereon, these terminal members being shown in FIGURE 1 as pairs of terminals A₁—A₂, B₁—B₂, C₁—C₂, A₃—A₄, B₃—B₄, and C₃—C₄, it being understood that terminals identified with A's, B's or C's are connected to corresponding input buses A, B or C respectively.

An electrical connection diagram of this system is set forth in FIGURE 2 for purposes of clarity, while the physical interconnecting of the terminals and the buses may be seen with reference to my above noted U.S. Patent No. 2,737,613.

Each set of terminals of the panel board of FIGURE 1 is connectable to a three phase circuit breaker. By way of example, the upper terminals A₁, B₁, C₁ and A₃, B₃, and C₃ are connectable to circuit breakers 12 and 14, as shown in the dotted lines, by means of plug-in terminals, as will be described more fully hereinafter.

In a similar manner, the lower terminals A₂, B₂ and C₂ and A₄, B₄, and C₄ are connectable to another pair of circuit breakers indicated in dotted lines as circuit breakers 16 and 18.

FIGURE 3 more specifically shows the engagement between upper terminals A₁, B₁, and C₁ and the circuit breaker terminals of the circuit breaker 12. Thus, the circuit breaker 12 is equipped with tulip clip type terminals which include spring fingers 20, 22 and 24 for phases A, B and C respectively. Each of these spring fingers are electrically connected to studs 26, 28 and 30 respectively by means of the garter springs 32, 34 and 36 respectively. The lower portions of spring fingers 20, 22 and 24 are provided with garter springs 38, 40 and 42 which bias the spring fingers toward a smaller diameter.

Thus, when the tulip-clip type contacts are pressed into engagement with their cooperating terminals A₁, B₁, and C₁ of panel board 10 it is evident that the spring fingers will be distended to fit over the enlarged head of the terminal and will thereafter be pressed into contact engagement with the reduced portion of their cooperating terminals.

Once the electrical plug-in connection is achieved, as has been set forth above, the circuit breakers may be mechanically fastened to the panel board by mechanical connecting members such as bolts which cooperate with threaded apertures 48 and 50 in the panel board 10 to secure circuit breakers 12 and 14 to the panel board.

In a similar manner, circuit breakers 16 and 18 of FIGURE 1 may be secured by bolt means which pass through apertures in the circuit breakers and engage the threaded apertures 52 and 54 of FIGURE 1.

FIGURE 4 shows the manner in which a circuit breaker
having an operating handle 60 and a current capacity of twice the current capacity of any of the circuit breakers of FIGURE 1 may be adapted to be connected to panel board 10 of FIGURE 1. It is to be noted that the panel board construction of FIGURE 4 is identical to that of FIGURE 1 excepting the current rating of the various terminals fastened to panel board 10.

Circuit breaker 58, as seen in FIGURES 4, 5 and 6, is adapted to have a plug-in terminal means wherein each of the circuit breaker phases will be plugged into two parallel terminals of similar phase. Therefore, the net capacity of the two parallel connected terminals of each phase will equal the capacity of the larger circuit breaker 58.

The adapting means of FIGURES 4, 5 and 6 includes an adapting block of insulating material 62 which supports six tulip clip type connectors 63, 64, 65, 66, 67 and 68 which are disposed to cooperate with stud members, A1, A2, B1, B2, C1, and C2 respectively. As shown in FIGURE 4, adapting block 62 can be a separate component which can be electrically and mechanically connected to a standard circuit breaker, such as circuit breaker 58. However, as schematically indicated in FIGURE 4, the dotted line, block 62 could be an integral part of the circuit breaker 58.

Electrical conductors which may be contained within the block 62, as indicated in FIGURES 4 and 5, electrically connect terminals A1 and A2, B1 and B2, and C1 and C2. A common conductor from each of these connected pairs of terminals is then brought out as conductor 70, 71 and 72 and to the three respective phases of the circuit breaker 58. Thus, each of the circuit breaker phases is connected to their respective bus A, B or C through two parallel connected terminals whereby the relatively high current capacity of the circuit breaker 58 may be handled by these two parallel connected terminals.

Clearly, a second circuit breaker which is adapted in the same manner as circuit breaker 58 may be connected in an identical manner to terminals A1—A2, B1—B2 and C1—C2.

While FIGURES 4, 5 and 6 have set forth an embodiment of my novel invention utilizing alternate fingers, it is to be understood that this is only one of many ways that a high capacity circuit breaker can be adapted in accordance with my novel invention whereby each circuit breaker phase is connected to a plurality of electrically corresponding but lower capacity terminals of a panel board.

By way of example, FIGURE 7 sets forth the top view of a second embodiment of my novel invention wherein the panel board 10 has a first and second relatively high capacity molded case circuit breaker 84 and 86 connected thereto. Here, however, the adapted portions 88 and 90 of circuit breakers 84 and 86 respectively span adjacent terminal members, rather than alternate terminal members as was the case in FIGURE 4. That is to say, adaptation portion 88 is constructed to connect terminals A1 and A2 to circuit breaker phase A, terminals B1 and B2 to circuit breaker phase B and terminals C1 and C2 to circuit breaker phase C.

Clearly, plug-in type connectors may be provided for portion 88 of circuit breaker 84 so that it is connected in a manner substantially identical to that set forth above in conjunction with circuit breaker 58 of FIGURE 4, the exception being that a different set of terminals are used.

In a similar manner, a second high capacity circuit breaker 86 having adaptation portion 90 connected to the remaining sets of fingers wherein terminals A1—A2, B1—B2 and C1—C2 are connected to phases A, B and C respectively of circuit breaker 86.

FIGURE 8 shows a top view of a further embodiment of my invention where each of circuit breakers 92 and 94 are provided with adaptation members 96 and 98 respectively. Each of adaptation members 96 and 98 have three protruding fingers which carry connected terminal members for spanning adjacent terminals on panel board 10 to provide parallel connected terminals for each phase of their respective circuit breaker.

Thus, extension 96 is provided with internal connecting means for connecting terminals A1—A2, C1—C2 and B1—B2 respectively, for each respective phase of circuit breaker 92. Similarly, extension or adaptation member 98 connects terminals B1—B2, A1—A2 and C1—C2 respectively together.

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. An adaptation means for connecting a relatively high capacity circuit breaker to a panel board having relatively low capacity terminals; said panel board comprising a first, second and third pair of said low capacity terminals corresponding to a first, second and third phase respectively of a multiphase power source; each of said low capacity terminals being energizable by means independent of said adaptation means; one terminal of each of said pairs of terminals being connectible to a respective phase of a first relatively low capacity circuit breaker, the other terminal of each of said pairs of terminals being connectible to a second relatively low capacity circuit breaker; said adaptation means for connecting said relatively high capacity circuit breaker being constructed to connect said one terminal of each of said pairs of terminals in parallel with said other terminal of the same pair and to the respective phase of said relatively high capacity circuit breaker only.

2. An adaptation means for connecting a relatively high capacity circuit breaker to a panel board having relatively low capacity terminals; said panel board comprising a first, second and third pair of said low capacity terminals corresponding to a first, second and third phase respectively of a multiphase power source; each of said low capacity terminals being energizable by means independent of said adaptation means; one terminal of each of said pairs of terminals being connectible to a respective phase of a first relatively low capacity circuit breaker, the other terminal of each of said pairs of terminals being connectible to a second relatively low capacity circuit breaker; said adaptation means for connecting said relatively high capacity circuit breaker being constructed to connect said one terminal of each of said pairs of terminals in parallel with said other terminal of the same pair and to the respective phase of said relatively high capacity circuit breaker only; said adaptation means being an integral part of said relatively high capacity circuit breaker.

3. An adaptation means for connecting a relatively high capacity circuit breaker to a panel board having relatively low capacity terminals; said panel board comprising a first, second and third pair of said low capacity terminals corresponding to a first, second and third phase respectively of a multiphase power source; each of said low capacity terminals being energizable by means independent of said adaptation means; one terminal of each of said pairs of terminals being connectible to a respective phase of a first relatively low capacity circuit breaker, the other terminal of each of said pairs of terminals being connectible to a second relatively low capacity circuit breaker; said adaptation means for connecting said relatively high capacity circuit breaker being constructed to connect said one terminal of each of said pairs of terminals in parallel with said other terminal of the same pair and to the respective phase of said relatively high capacity circuit breaker only; said adaptation means being removable connected to said relatively high capacity circuit breaker.
4. An adaptation means for connecting a relatively high capacity circuit breaker to a panel board having relatively low capacity terminals; said panel board comprising a first, second and third pair of said low capacity terminals corresponding to a first, second and third phase respectively of a multiphase power source; each of said low capacity terminals being energizable by means independent of said adaptation means; one terminal of each of said pairs of terminals being connectable to a respective phase of a first relatively low capacity circuit breaker, the other terminal of each of said pairs of terminals being connectable to a second relatively low capacity circuit breaker; said adaptation means for connecting said relatively high capacity circuit breaker comprising a plurality of terminals positioned to cooperate with each of said panel board terminals; said plurality of terminals of said adaptation means being electrically connected to connect said one terminal of each of said pairs of terminals in parallel with said other terminal of the same pair and to the respective phase of said relatively high capacity circuit breaker only.

5. An adaptation means for connecting a relatively high capacity circuit breaker to a panel board having relatively low capacity terminals; said panel board comprising a first, second and third pair of said low capacity terminals corresponding to a first, second and third phase respectively of a multiphase power source; each of said low capacity terminals being energizable by means independent of said adaptation means; one terminal of each of said pairs of terminals being connectable to a respective phase of a first relatively low capacity circuit breaker, the other terminal of each of said pairs of terminals being connectable to a second relatively low capacity circuit breaker; said adaptation means for connecting said relatively high capacity circuit breaker comprising a plurality of terminals positioned to cooperate with each of said panel board terminals; said plurality of terminals of said adaptation means being electrically connected to connect said one terminal of each of said pairs of terminals in parallel with said other terminal of the same pair and to the respective phase of said relatively high capacity circuit breaker.

6. An adaptation means for connecting a relatively high capacity circuit breaker to a panel board having relatively low capacity terminals; said panel board comprising a first, second and third pair of said low capacity terminals corresponding to a first, second and third phase respectively of a multiphase power source; each of said low capacity terminals being energizable by means independent of said adaptation means; said plurality of low capacity terminals being positioned to be connectable to a plurality of low capacity multiphase circuit breakers, each of said low capacity circuit breakers being connectable to one terminal of each of said pluralities of terminals; said adaptation means comprising a plurality of adaptation terminals positioned to cooperate with at least two terminals of each of said plurality of panel board terminals; said plurality of adaptation terminals of said adaptation means being electrically connected to connect each of said two panel board terminals in parallel with one another and to the respective phase of said relatively high capacity circuit breaker only.

7. An adaptation means for connecting a relatively high capacity circuit breaker to a panel board having relatively low capacity terminals; said panel board comprising a plurality of first, second and third pairs of said low capacity terminals corresponding to a first, second and third phase respectively of a multiphase power source; each of said low capacity terminals being energizable by means independent of said adaptation means; said plurality of low capacity terminals being positioned to be connectable to a plurality of low capacity multiphase circuit breakers, each of said low capacity circuit breakers being connectable to one terminal of each of said pluralities of terminals; said adaptation means comprising a plurality of adaptation terminals positioned to cooperate with at least two terminals of each of said plurality of panel board terminals; said plurality of adaptation terminals of said adaptation means being electrically connected to connect each of said two panel board terminals in parallel with one another and to the respective phase of said relatively high capacity circuit breaker only; said adaptation means being an integral part of said relatively high capacity circuit breaker.

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