Nov. 1, 1966 G. W. KNECHT ETAL 3,283,110

HALF-WIDTH CIRCUIT BREAKER MODIFICATION
FOR FULL WIDTH LOAD CENTERS
Filed Oct. 21, 1964

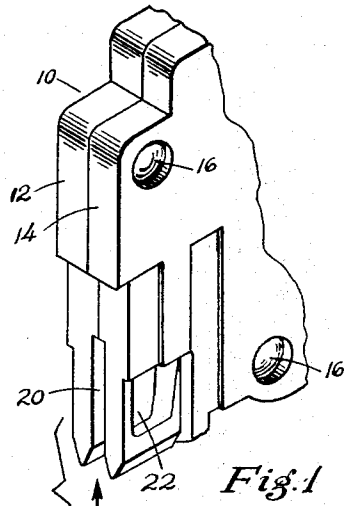


Fig. 1

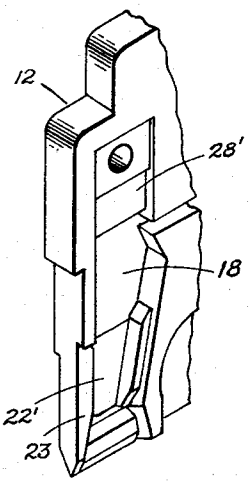


Fig. 2

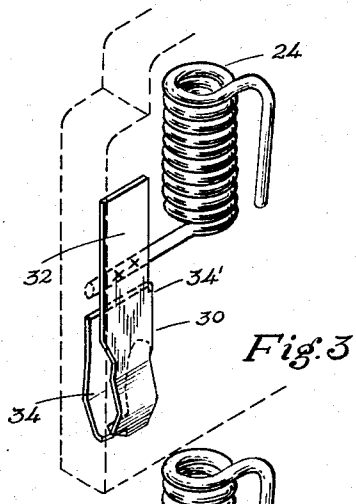


Fig. 3

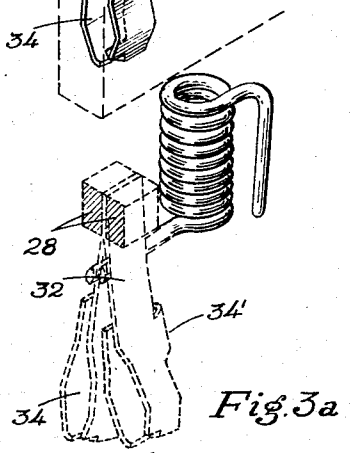
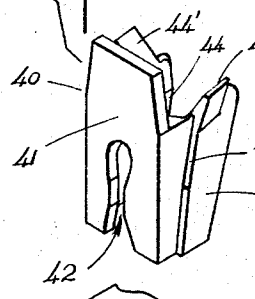


Fig. 3a



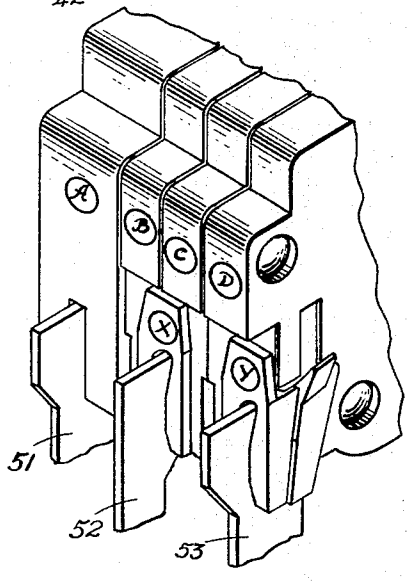


Fig. 5

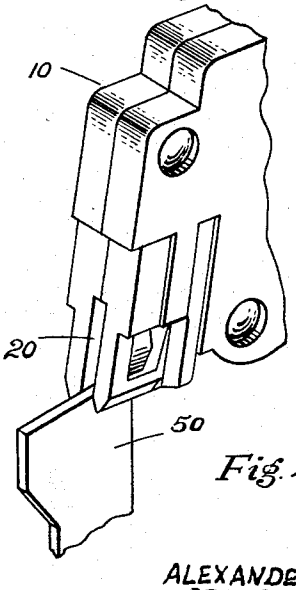


Fig. 4

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HALF-WIDTH CIRCUIT BREAKER MODIFICATION FOR FULL WIDTH LOAD CENTERS

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15 Claims. (Cl. 200—168)

This invention relates to circuit breakers and panels or load centers therefor, and in particular to an arrangement for electrically and mechanically connecting a circuit breaker of a given width to a load center constructed to receive circuit breakers of greater width.

The conventional load center, for home and light industrial application, comprises two or more power buses from which bus-blades project in a parallel array; the blades of the buses being alternated so that neighboring blades are associated with opposite polarity buses. The spacing between adjacent blades is approximately one inch and is designed to accommodate the standard one-inch width circuit breaker.

Several years ago half inch width circuit breakers made their appearance on the market, and while panelboards may be constructed specifically to utilize what will be hereinafter referred to as half-width breakers, it is highly desirable to utilize existing panelboards adapted for the standard width breakers. In addition, it is often economically desirable to construct a single panelboard which will have the flexibility utilizing both the standard and half-width circuit breakers substantially interchangeably.

The conventional circuit breaker, be it single or double pole, is designed with a receptive contact clip centered at the lower front corner. When applied to a bus-blade, the breaker sits astride the blade with the contact clip gripping its opposite sides and one half of the breaker width overhanging the blade on either side. Since a neighboring unit is likewise disposed on a bus-blade one-inch away, the two units are contiguous. At this point it bears mentioning that further space optimization is achieved by making the bus-blade length sufficient to engage two clip-on units in front end abutment. Thus, it may be said as a general proposition that conventionally the number of clip-on unit pairs in a row equals the number of bus-blades.

The innovation of half width breakers would at first appear to double the circuit breaker capacity of a given load center. However, it is apparent, that the reduced width is not significant in this regard if the conventional clip-on feature is retained, since the maximum number of units per blade remains at two.

Accordingly, it is an object of this invention to provide a circuit breaker-load center arrangement which optimizes the use of included space.

It is another object of this invention to provide means for adapting narrow circuit breakers, particularly half inch width breakers, to panelboards designed to receive larger width circuit breakers, particularly one-inch width breakers.

It is a further object of this invention to provide a circuit breaker portion which is operatively juxtaposed to the bus-blade with a blade contact (i.e. one whose function it is to contact the bus-blade) capable of being disposed on either the left or right of the breaker, depending upon the side of the bus-blade on which the circuit breaker is located.

It is a further object of this invention to provide means for properly seating a half-width circuit breaker unit in a standard panelboard; means for imparting contact pressure to the circuit breaker blade contact; and means for

directing the circuit breaker blade contact to the proper side of the breaker.

It is a further object of this invention to satisfy the last mentioned object with a single adapter.

It is a further object of the invention to provide by coaction of the breaker housing and adapter, the spacing and insulation required between conductors of differing polarity.

It is a still further object of this invention to defeat the use of the inventive breaker without the aforementioned adapter.

Briefly, the invention is predicated upon the concept of providing a circuit breaker with an internal chamber communicating with a pair of windows disposed on the other side of the breaker at the portion thereof operatively positioned between bus-blades; a flexible blade contact mounted within said chamber with a portion centrally located between the windows; and adapter means mechanically coupling the bus-blade and circuit breaker for seating the latter with respect to the former and piloting the flexible blade contact contiguous the adjacent bus-blade.

The above mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will best be understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings wherein:

FIG. 1 is an exploded perspective view of the front end of a circuit breaker and the associated adapter according to the invention;

FIG. 2 illustrates one-half of the circuit breaker module shown in FIG. 1;

FIGS. 3 and 3*a* illustrate the blade contact, its disposition in the circuit breaker, and its degree of movement;

FIG. 4 shows an attempt to incorrectly mount the circuit breaker; and

FIG. 5 illustrates an array of bus-blades with conventional and half-width circuit breakers mounted thereon.

Refrering now to the figures and in particular to FIGS. 1 through 3*a*, the novel circuit breaker and adapter will now be described. Circuit breaker module or unit **10** is composed of two mating housing sections **12** and **14**, preferably molded of an insulator material and joined together by any suitable means such as the rivets **16**. The cooperating sections **12** and **14** form a cavity **18** (FIG. 2) within which the blade contact will be disposed. Communicating with the cavity **18**, at the lower front end of the circuit breaker is a centrally located slot **20** providing an access means and a pair of laterally offset windows **22** and **22'**.

At this juncture, it bears mentioning that the circuit breaker "front end" will be defined herein as that portion of the breaker to be operatively positioned in juxtaposed relationship to the bus-blade of the load center; and "window" will be defined herein as that portion of the breaker through which the breaker contact exits for operative contact with a bus-blade.

Disposed within the chamber **18**, and electrically and mechanically coupled, for example by welding, to the electromagnet coil **24** (FIG. 3) of the pole mechanism is the blade contact **30**. This contact is composed of a flexible conductive material such as spring bronze, and comprises an upper leaf portion **32** and an integral nose portion **34**; the latter of which is provided (for a reason that will become apparent) an internal resiliency by virtue of the fold **34'**. The extreme lower portion of the nose section is formed to preclude penetration into this section from below by the bus blade. This may be conveniently accomplished by serrating or side lapping the abutting edges.

To ensure sufficient resiliency and return of the blade contact to its symmetrical location within the cavity when

non-operational, it is depended at the leaf section **32** by the clamp **28** (FIG. 3*a*). The clamp itself may be simply formed of abutting portions of the mating housing sections, one of which **28'** is shown in FIG. 2 at the top of the chamber **18**.

FIG. 1 also illustrates the adapter or blade clip **40**, so called because it adapts the breaker module to a left or right positioning with respect to the bus-blade and also rides or clips the blade; thereby positioning the front end of the breaker while simultaneously compensating for the side-wiping force of the blade contact which in the absence of the stabilizing force imparted by the adapter in conjunction with the bus-blade would effect a lateral breaker movement.

The adapter is composed of high impact insulator material such as molded polycarbonate resin and comprises a frontal plate member **41**, containing a slot **42** communicating with the bottom and adapted to sit astride a bus-blade. A pair of wings **44** and **46** are disposed on either side of the plate, extending to the rear thereof. The wings are dimensioned to enter the circuit breaker slot **20** and are adapted by the upper camming surfaces **44'** and **46'** to pilot the blade contact to the right and left, respectively. This may be done by inserting the adapter into the breaker by hand or by inserting the breaker over the adapter when the adapter has already been positioned on the blade as in the case when it is already in use holding another breaker in place. Each wing has a tapered lip (for example **46''**) on the outer edge thereof for cooperating with the outer frame of the corresponding window (for example **23**, FIG. 2) to guide the blade tight against the front face of the circuit breaker; the latter, being recessed to form a flush fit. It will be appreciated that because of the views chosen to represent the breaker, the lip and window mentioned in the foregoing are not those which actually mate, and that lip **46''** actually cooperates with a similar window frame portion in breaker section **14**.

Assuming now the circuit breaker is to be mounted to the left of a bus-blade (such as shown in FIG. 5, breaker D) the left wing **44** would be inserted into the slot **20**, its upper surface **44'** thereby camming the breaker contact to the right into the window **22**, in side-wiping relation to the bus-blade **53**; simultaneously providing a wall of insulation between the breaker contact of breaker D and the opposite polarity contact of breaker C. The slot **42** of the adapter will now appear approximately even with the right face of the circuit breaker and is inserted over a bus-blade to position the front end of the breaker and simultaneously compensate for the side-wiping force produced by the adapter wing **44** against the blade contact.

Insertion of the other wing **46** into the circuit breaker slot **20** will of course produce a mirror image effect (equivalent to breaker C in FIG. 5). Thus it may be seen that regardless of which side it is used on, the blade clip cooperates with the bus-blade and blade contact to become a member-in-tension maintaining contact pressure between bus-blade and blade contact.

FIG. 4 illustrates a feature of the invention for defeating an attempt to erroneously seat the circuit breaker on a bus-blade **50**. Suffice to say, that since the blade contact is centrally located within the breaker cavity (in the absence of the use of the blade clip) the nose portion of the blade contact **30** will abut the top of the bus-blade, thereby preventing the seating of the front end of the breaker, and therefore the closing of the load center cover (not shown).

FIG. 5 illustrates an array of bus-blades, with the half-width circuit breakers of the invention mounted thereon in several distinct combinations. The circuit breaker designated by the letter A is a standard clip-on breaker and is shown in this figure so that the inventive arrangement may be contrasted therewith and so that it will be clearly appreciated that both the standard and inventive arrangements may coexist in a single load center. For the purposes of illustration, it may be assumed that blades

51 and **53** stem from the same bus bar, which is opposite in polarity to that from which bus-blade **52** stems.

With each individual breaker considered as a pole, the following combinations may be seen to exist in FIG. 5:

	Pole	Adapter
1. Single pole left	C	X
2. Single pole right	D	Y
3. Duplex	B—C	X
4. 2-pole opposite polarity	C—D	X—Y

Apparent from the foregoing is the fact that a single adapter may be associated with two circuit breakers to establish the conventional duplex arrangement.

For the sake of clarity and to avoid detracting from the invention, only the front ends of the circuit breakers have been shown and described. For a description of the rear portions, and their cooperation with the load center reference may be had to copending application Serial No. 233,738, filed October 29, 1962, now Patent No. 2,198,992 to a common assignee. Further, it will be appreciated that while specific width dimensions have been set forth to provide an environment for the invention, these may be varied and are ultimately dependent only upon the load center bus-blade configuration.

While we have described above the principles of our invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of our invention as set forth in the objects thereof and in the accompanying claims. For example, the inventive concept may easily be adapted to the entire breaker of the above denoted copending application by merely adding the front end slot described herein and normally positioning the blade contact so that it lies internally of the breaker sides in a non-bus-blade contacting attitude. The adapter member wings may then, upon insertion in the slot, cam or key the breaker contact outwardly into its operative position.

We claim:

1. A circuit breaker adapted to be disposed on either side of a load center bus-blade for electrical contact therewith comprising:

a housing having an internal chamber communicating with the exterior through a pair of windows disposed on either side of the breaker at the front end thereof;

a flexible blade contact mounted within said chamber for movement of a portion thereof to said windows, said contact having a nose portion centrally located between said windows;

said housing including external access means for allowing maneuvering of said first mentioned portion of said flexible blade contact.

2. The circuit breaker claimed in claim **1** in combination with means for guiding the nose portion of the contact to either of said windows and maintaining said breaker front end contiguous a bus-blade.

3. A circuit breaker adapted to be disposed on either side of a load center bus-blade for electrical contact therewith comprising:

a housing having an internal chamber communicating with the exterior through a pair of windows disposed on either side of the breaker at the front end thereof and with a slot located at the underside of the front end between said windows and extending centrally up a portion of the front end face; and

a flexible blade contact mounted within said chamber for movement of a portion thereof to said windows, said contact having a nose portion centrally located between said windows.

4. The circuit breaker claimed in claim **3** in which said housing is composed of two mating sections, and said flexible blade contact is mounted within said chamber

by abutting portions of said sections acting as a clamp upon a portion of said contact.

5. The circuit breaker claimed in claim 3 in which said contact is a single relatively flat metal stamping, a section of which is folded over to form said nose portion.

6. The circuit breaker claimed in claim 3 in combination with means for guiding the nose portion of the contact to either of said windows and maintaining said breaker front end contiguous a bus-blade.

7. The combination claimed in claim 6 in which said guiding means comprises a front plate having an elongated slot therein for embracing a bus-blade, and a pair of wings disposed on either side of said plate parallel to said elongated slot and extending to the rear of said plate, each of said wings for entering the housing slot and urging the blade contact nose portion to the window intermediate the wings.

8. The combination claimed in claim 7, in which the front plate dimension perpendicular to the included slot approximately equals the width of the circuit breaker.

9. The combination claimed in claim 7 in which each of said wings contains a camming surface at the upper end thereof for initially contacting the nose portion of the contact blade.

10. The combination claimed in claim 7, in which each of said wings has a laterally offset tapered portion, said housing having a pair of corresponding surfaces within said chamber, each for engaging a wing at the tapered portion to guide the adapter member front plate snug to the front end of the circuit breaker.

11. The combination claimed in claim 10 in which the front end of the circuit breaker housing is recessed to flush mount the front plate.

12. An adapter member for circuit breaker bus-blade keying comprising a front plate having an elongated slot therein communicating with one end of said plate, and a pair of wings laterally offset on either side of said slot and extending to the rear of said plate.

13. The combination of a circuit breaker adapted to be mounted on either side of a load center bus-blade for electrical contact therewith comprising:

a housing having an internal chamber communicating with the exterior through a pair of windows disposed on either side of the breaker at the front end thereof and with a slot located at the underside of the front end and extending up a portion of the front face,

a flexible blade contact mounted within said chamber and normally disposed internally of the side planes of said breaker;

and an adapter member having an elongated slot therein for embracing a bus-blade and including means entering said breaker slot and keying said flexible blade contact outwardly of said breaker and contiguous the said bus-blade,

whereby in the absence of said adapter member said breaker contact remains in a non-bus-blade contacting position.

14. The combination claimed in claim 13, in which said adapter member comprises a front plate having an elongated slot therein for embracing a bus-blade, and a pair of breaker-slot-entering wings disposed on either side of said plate parallel said elongated slot and extending to the rear of said plate.

15. The combination of: a circuit breaker adapted to be disposed on either side of a load center bus-blade, said breaker having a contact member normally spaced from the adjacent bus-blade when inserted in said load center; and an integral adapter member comprising means for camming said breaker contact member against said bus-blade and means for rigidly positioning said circuit breaker in said load center.

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