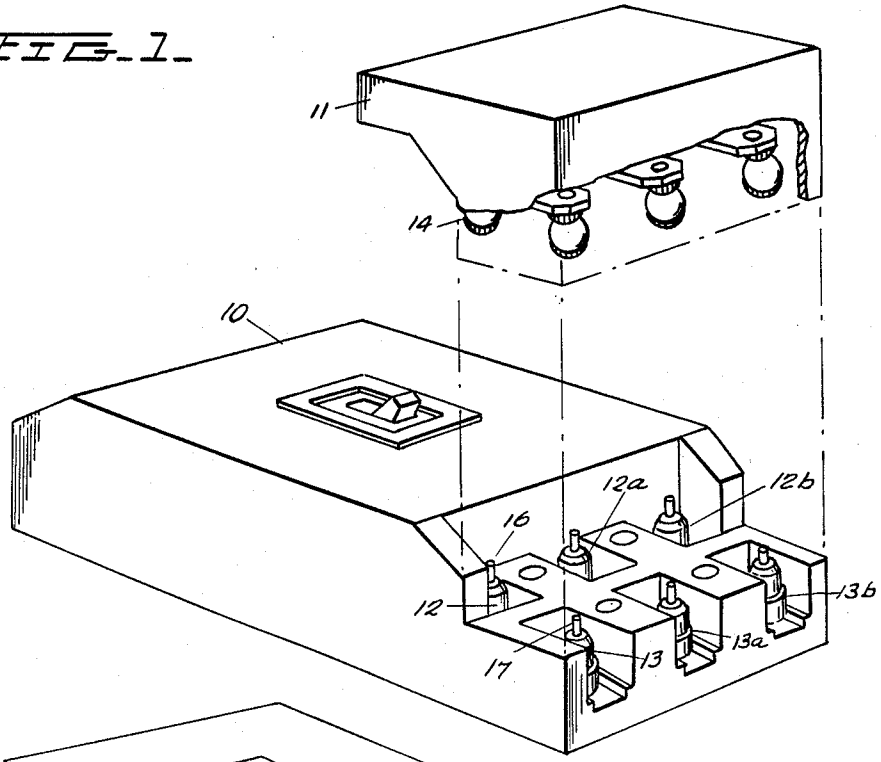
Nov. 8, 1960 A. BODENSCHATZ 2,959,760

ADAPTATION OF A BLISTER TYPE DISCONNECT MEANS

Filed Sept. 26, 1955 2 Sheets-Sheet 1

FIG. 1



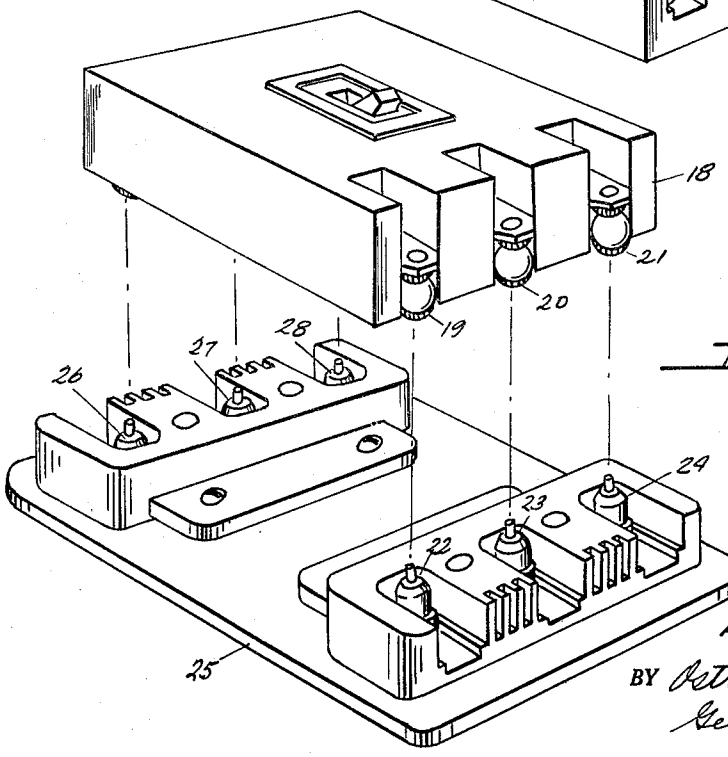


FIG. 2

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ADAPTATION OF A BLISTER TYPE DISCONNECT MEANS

Filed Sept. 26, 1955 2 Sheets-Sheet 2

FIG. 3a.

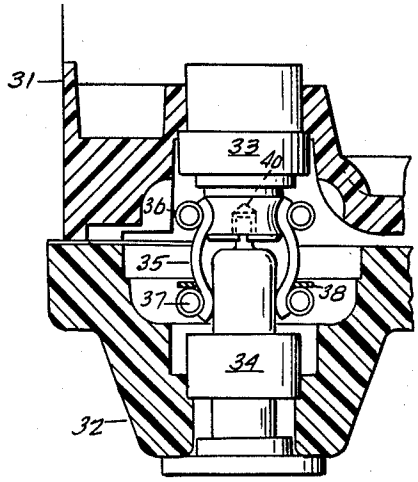


FIG. 3b.

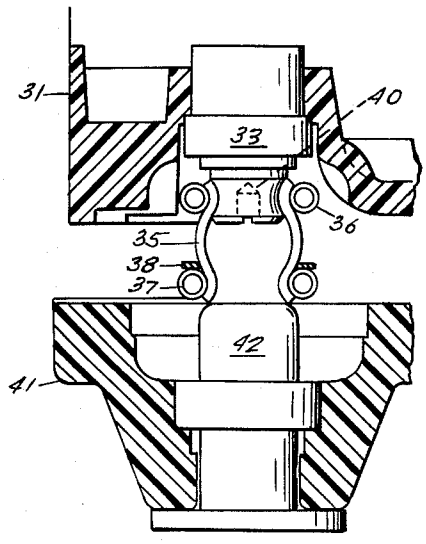


FIG. 4a.

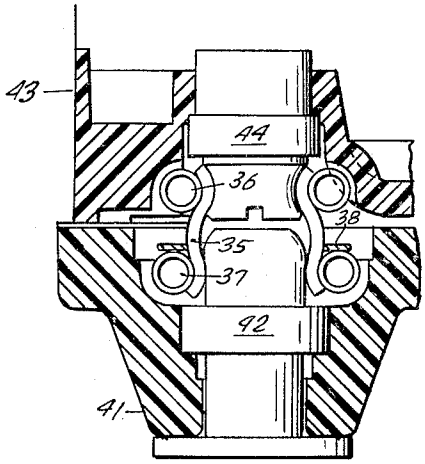
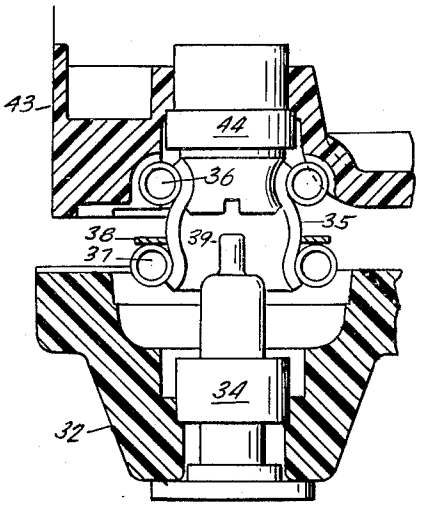


FIG. 4b.



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ADAPTATION OF A BLISTER TYPE DISCONNECT MEANS

August Bodenschatz, Philadelphia, Pa., assignor to I-T-E Circuit Breaker Company, Philadelphia, Pa., a corporation of Pennsylvania

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3 Claims. (Cl. 339—176)

My invention relates to an adaptation of blister type contact devices and more particularly to the adaption of a blister type disconnect contact of a circuit breaker and its associated fuse or panel board whereby connection between two units of different ratings can be prevented.

Blister type contact devices of the type to which my invention is directed are constructed to connect a current conducting protrusion of a first electrical device such as a circuit breaker terminal to a current conducting protrusion of a second current carrying device such as a fuse terminal. A plurality of spring-like current carrying fingers surround one of the protrusions and means are provided to maintain the current carrying fingers thereto at one end, the other end of the fingers protruding past the end of the current carrying protrusion to form a hollow cylinder. The protruding end of the cylinder which is formed by the current carrying fingers is then slipped over the protruding current carrying member of the cooperating device to form a self biased current carrying connection thereby placing the first and second current conducting protrusions in electrical contact.

In using this type of blister contact arrangement, it is possible to connect a device of one rating to a second device of a different rating. Hence, in a series connected fuse and circuit breaker, as described in copending application Serial No. 461,378, filed October 11, 1954, to Mr. William Harold Edmunds entitled "Circuit Breaker Having Electrical and Mechanical Co-ordination with a Current Limiting Device," and assigned to the assignee of the instant invention, it would be possible, with this type of contact, to connect a circuit breaker to a fuse having a higher rating than that of a circuit breaker since the cylindrical protrusion of the plurality of fingers would deflect sufficiently to fit over the terminal post of the fuse even though this terminal has a larger diameter than that of a terminal post of a fuse of the same rating as the circuit breaker. This possible connection of a series connected fuse of higher rating than its associated circuit breaker, however, obviously defeats the purpose of the combination since the fuse will not interrupt the predetermined values of current which are assigned to it in the combination.

Similarly, in a blister type contact, it would be undesirable to plug a circuit breaker into a panel board or fuse when the circuit breaker is of a smaller rating than its associated component since the breaker would possibly operate under rated current conditions on the circuit.

My invention contemplates a system whereby disconnect contacts of the blister type can be adapted to allow the connection of two devices only if the rating of the two devices are of predetermined relative magnitudes. Hence, the disconnect contacts can be modified to allow the insertion of a first device to a second device, only if the two devices have the same rating. Similarly, the disconnect contact of a first and second device can be modified to allow insertion of the first into the second only if the rating of the first is equal or less than the rating of the second.

The principle of my invention is to provide a restraining means around the periphery of the protruding cylinder of the blister contact device to prevent circumferential expansion of the cylinder beyond a predetermined amount and to adapt one current carrying protrusion of a device such as a circuit breaker with an interference tip, its cooperating device of the same rating having a depression to cooperate with this interference tip.

It is clear that the use of a retaining ring will prevent the expansion of the flexible fingers forming the blister device to thereby block the insertion into a unit which would have a higher rating and therefore a current carrying protrusion or terminal of larger diameter. However, the blister retaining ring will be allowed to expand sufficiently to fit on a unit of either the same or lower rating.

In the case of a fuse combined with a circuit breaker, it is clear that the use of a fuse of smaller rating than the circuit breaker would be a permissible condition.

If, however, it is desired to prevent the insertion of the larger circuit breaker adapted to carry a blister having a retaining ring of my invention into a unit of small rating, I have found it necessary to provide an interference tip on the other device which will mate only with a depression in a circuit breaker terminal of similar rating. Clearly, when the circuit breaker is of larger rating, the interference tip of the smaller unit will prevent complete insertion even though the protruding cylinder of the contact fingers has a large enough diameter to slip over the terminal post. If desired, the interference tip may be made of insulating material to prevent a flashover or arcing from the tip to the other components of the circuit breaker terminal which may be at a different potential.

Accordingly, a primary object of my invention is to provide means for preventing the connection of two devices having disconnect contacts of the blister type when the rating of the device are not in predetermined relative magnitudes.

Another object of my invention is to provide a retaining ring about the cylinder formed by the protruding fingers of a blister type device to allow a predetermined increase in the circumference of the cylinder thereby preventing the insertion of the cylinder on a terminal post of a diameter larger than a predetermined amount.

Another object of my invention is to provide an interference tip on the terminal post of a first device which will cooperate with a depression on a terminal post of a second device, these two devices being rated in predetermined relative magnitude, whereby the insertion of a device of a different rating will be prevented by the interference tip.

Another object of my invention is to provide a retaining ring on the circumference of a blister type contact device whereby expansion of the circumference is limited to a predetermined amount by the retaining ring and to also provide an interference tip on the terminal post of a device which is adapted to receive the blister contact device, the interference tip and retaining ring cooperating in such a manner with the terminal posts of the two devices to be fastened that only devices of equal rating may be connected.

Another object of my invention is to provide a circuit breaker with a disconnect contact of the blister type wherein the contacts are provided with a retaining ring and to provide a cooperating panel board or fuse terminal with an interference tip which will cooperate with a depression in the circuit breaker terminal post thereby as-

suring a current carrying contact only between the circuit breaker and panel board or fuse of similar rating.

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

Figure 1 shows a perspective view of a circuit breaker and a fuse type device such as the combination described in the aforementioned copending United States application Serial No. 461,378, filed October 11, 1954, where the disconnect contacts are adapted to be of the blister type.

Figure 2 shows the combination of a circuit breaker which is adapted to be plugged into a panel board, the circuit breaker and panel board being shown in their disengaged position.

Figure 3*a* shows a pair of disconnect contacts which could be utilized by the devices of either Figure 1 or Figure 2 in which the blister type device is provided with the retaining ring of my invention and the devices are in their contact engaged position.

Figure 3*b* is similar to Figure 3*a* but shows the operation of the retaining ring of my novel invention when the circuit breaker is of a smaller rating than the component in which it is to be inserted, the retaining ring preventing expansion of the blister device thereby preventing the device from assuming the contact engaged position.

Figure 4*a* shows a second pair of devices of similar rating which could be the device of Figure 1 or Figure 2, the devices being in the contact engaged position.

Figure 4*b* is similar to Figure 4*a* but shows the condition when the units have an interference tip to prevent insertion of a unit of higher rating.

Figure 1 shows a perspective view of a circuit breaker **10** and a device **11** which could contain fuse elements to be connected in series with the circuit breaker **10**. Both the circuit breaker **10** and fuse device **11** are three phase devices, the circuit breaker disconnect contacts **12** and **13** cooperating with disconnect contacts **14** and **15** of the fuse device **11**. Similarly, circuit breaker disconnect contacts **12***a* and **13***a*, **12***b* and **13***b* of the other two phases are constructed to cooperate with similar sets of disconnect contacts on the fuse device **11**. It is clear that the fuse is connected between the terminals **14** and **15** of the fuse device **11**. Similar remarks may then be made for each of the other circuit breaker terminals and fuse terminals. Hence, if it is now desired to place the fuse devices into series with each phase of the circuit breaker, one merely has to insert the disconnect contacts of the complete unit **11** into the disconnect switch contacts of the circuit breaker **10**.

It is to be clearly noted that the disconnect contacts are shown as being of the blister type and that the circuit breaker disconnect contacts **12** and **13** are provided with interference tips **16** and **17**. Details of this contact construction will be more full presented hereinafter.

Figure 2 shows a second application of blister type contacts which may be modified in accordance with my novel invention and the figure more particularly shows a circuit breaker **18** which is constructed to have disconnect contacts of the blister type **19**, **20** and **21** for each of its three phases. These contacts are now so constructed and positioned as to cooperate with the three contacts **22**, **23** and **24** of the panel board element **25**. A similar disconnect contact structure is provided for both the circuit breaker **18** and the panel board **25** at its other end, these disconnect elements for the panel board **25** being shown as contacts **26**, **27** and **28**, which will cooperate with associated disconnect contacts of the circuit breaker **18** which cannot be seen in the figure.

As previously mentioned, it would be undesirable in the case of the fuse and circuit breaker combination of Figure 1 to use a fuse of a higher rating than that of the circuit breaker although it would be allowable to use a fuse of a smaller rating. Similarly, in the case of Figure 2, it would be undesirable to use a circuit breaker of a higher rating than that of the panel board although it may be possible to use a circuit breaker of a lower rating than that of the panel board.

As will be more fully described hereinafter, my novel invention will adapt the blister type contact devices shown in Figures 1 and 2 in such a manner as to prevent the connection between a fuse and circuit breaker when the fuse has a greater rating than that of the circuit breaker or will prevent the connection of a circuit breaker and a panel board where the circuit breaker is of a greater rating than that of the panel board.

Figure 3*a* shows a sectional view of one pair of the disconnect contacts of equal rating which could be applied to the structures of either Figure 1 or 2, these contacts being in the engaged position. Hence, mounting block **31** may be a portion of the base of the circuit breaker **10** of Figure 1 or circuit breaker **18** of Figure 2. Similarly, the mounting block **32** of Figure 3*a* may be a portion of the fuse device **11** of Figure 1 or the panel board **25** of Figure 2.

It is desired to make an electrical connection from stud **33** of mounting block **31** to the stud **34** of mounting block **32**.

The blister type contact device of Figure 3*a* is shown as being comprised of a plurality of electrical conducting fingers **35** which encircle the stud **33** and are maintained thereto by means of a garter spring **36**. Obviously, any other desired fastening means could be utilized. The lower end of the fingers **35** are held together by means of a spring **37** which, as is shown in Figure 3*a*, biases the finger **35** into contact engagement with the stud **34** to thereby complete the electrical circuit between stud **33** and stud **34**. Clearly, disengagement of the two components **31** and **32** may be achieved by merely lifting the base **31** off of the base **32** thereby causing the contact fingers **35** to slide off of the stud **34**. Similarly, contact engagement could be achieved by merely forcing the contact finger **35** on stud **34**, the diameter of the hollow cylinder formed by the contact fingers enlarging against the biasing action of the spring **37** to accomodate the stud **34**.

In accordance with my novel invention, a retaining ring **38** is, as shown in Figure 3*a*, positioned concentrically with the contact fingers **35** in such a manner as to allow the full circumferential expansion required of fingers **35** to accomodate the stud **34** which is of the same rating. As will be shown hereinafter, if it is attempted to insert the base **31** into the base **32** of a device having a larger rating and, therefore, a larger diameter stud **34**, the retaining ring **38** will prevent the insertion by not allowing a full circumferential expansion of the contact fingers **35**.

Figure 3*a* further shows an interference tip **39** attached to stud **34** which is inserted into a mating depression **40** of the stud **33**. Interference tip **39** may be made of insulating material to prevent accidental contacting when an attempt is made to connect mismatched units and the circuit breaker is closed.

The operation of my novel retaining ring may be more fully understood when referring to Figure 3*b* which shows the attempted insertion of the block **31** of Figure 3*a* which could be a circuit breaker terminal into the block **41** which could be the terminal of a fuse device as could have been the device **32** of Figure 3*a*, the difference between the two units **32** and **41** being that the unit **41** is of a higher rating and does not have an interference tip. In view of the higher rating of the unit **41**, it is clear that its terminal post **42** will have a greater diameter than that of the post **34** of Figure 3*a*. It is, therefore, seen that upon the attempted insertion, the retaining ring **38** will not allow the fingers **35** to sufficiently expand to allow the fingers to enter over the post **42**.

Figure 4*a* now shows the unit **41** of Figure 3*b* when a device **43** of a corresponding rating has been inserted therein. Stud or terminal **44** of device **43** is shown to have a blister contact arrangement similar to that of

unit **31** and comprises the current carrying fingers **35**, springs **36** and **37** and retaining ring **38**. Stud **44**, however, is not provided with a depression that would cooperate with interference tip **39** of unit **32**.

As further shown in Figure *4a*, the retaining ring **38** of the device **43**, which has a larger diameter than the unit **31** of Figure *3a*, now allows sufficient expansion of the fingers **35** to encompass the stud **34**.

Figure *4b* now shows the conditions when it is attempted to insert the device **43** of Figure *4a* into the smaller device **32** of Figure *3a*. As was previously described, this connection would be undesirable if unit **32** were a portion of the panel **25** of Figure 2 and the unit **42** were a portion of the circuit breaker **18** of Figure 2.

It is clearly seen in Figure *4b* that although the diameter of the cylinder formed by contact fingers **35** is sufficiently large to allow entrance therein of the stud **34**, the interference tip **39** of unit **32** will prevent a complete insertion of unit **42** into the unit **32** since there is no depression in the face of stud **33**. Therefore, attempts by operating personnel to secure the breaker in position are defeated. Since interference tip **39** can be of insulating material, the impingement of the tip **39** and stud **44** will not complete an electrical circuit.

In the foregoing, it was seen how a first set of equally rated devices **31** and **32** of Figure *3a* and a second set of equally rated devices **41** and **43** of Figure *4a* could be modified in accordance with my invention so that:

(1) As shown in Figure *3b*, device **31** could not be plugged into a unit **41** of a larger rating. It would, however, be possible to insert a device **31** into a device of the type of device **32** if the rating of device **32** were smaller than the rating of device **31**. These are essential limitations in the case of device **31** being a circuit breaker and device **32** being a fuse.

(2) As shown in Figure *4b*, device **44** could not be plugged into a unit **32** of a smaller rating. This is an important limitation if device **43** were a circuit breaker and device **32** were a panel board. If both an interference tip and a retaining ring are provided as is the specific case of Figure 4, the units must be of equal ratings in order to be engaged.

It is, however, clear that these novel retaining and interfering principles for defeating the connection between mismatched units can be expanded beyond the combination of the two sets of ratings, as described herein. That is to say, a whole line or range of ratings can be constructed in accordance with the novel principles set forth herein. Hence, in a system of ten units, the retaining rings of each unit can be gradually increased in diameter to thereby allow insertion of one unit into a unit of equal rating or smaller rating. Similarly, interference tips may be provided with cooperating depressions in cooperating units in order that a unit can be inserted only in a unit of equal or larger rating.

In the foregoing, I have described my invention only in connection with preferred embodiments thereof. Many variations and modifications of the principles of my invention within the scope of the description herein are obvious. Accordingly, I prefer to be bound not by the specific disclosure herein but only by the appended claims.

I claim:

1. In a pair of disconnect contacts comprising a first terminal and a second terminal; said first and second terminals having an engaged and disengaged position; a plurality of current conducting elements each being electrically connected at one end to said first terminal to surround a periphery of said first terminal; the other end of said current conducting elements being constructed to electrically engage said second terminal on

a periphery of said second terminal when said first and second terminals are moved to the engaged position; a protrusion being provided to prevent the engagement of said first and second terminals when the ratings of said first and second terminals are different; said protrusion being on said second terminal and a depression in said first terminal; said protrusion being insertable in said depression when said terminals are moved to the engaged position when the ratings of said first and second terminals are the same.

2. In a pair of disconnect contacts comprising a first terminal and a second terminal having an engaged and disengaged position; a plurality of current conducting elements being electrically connected at one end to said first terminal and forming a substantially cylindrical shape; the other end of said cylindrical shape formed by said current conducting elements being constructed to electrically engage said second terminal on an annular shaped area of said cylinder when said first and second terminals are moved to the engaged position, a protrusion to prevent the engagement of said first and second terminals when the rating of said first and second terminals are different, said protrusion being mounted on one of said terminals and a depression in the other of said terminals; said protrusion being insertable in said depression when said terminals are moved to the engaged position when the rating of said first and second terminals are the same.

3. A pair of current carrying terminal elements movable with respect to one another between an engaged and disengaged position; a contact means electrically and mechanically connected to one of said pair of current carrying terminal elements; a portion of said contact means being adapted to be electrically connected to the other of said pair of current carrying terminal elements when said pair of current carrying terminal elements are moved to their said engaged position to thereby electrically connect said pair of current carrying terminal elements; a protrusion connected to and extending from one of said pair of current carrying terminal elements and a depression in the other said pair of current carrying elements; said protrusion and said depression having relative positions with respect to one another; said protrusion permitting electrical connection between said pair of current carrying terminal elements when said protrusion enters said depression when said pair of current carrying elements are moved to said engaged position; said protrusion and said depression being positioned in accordance with the rating of their respective current carrying terminal element; said protrusion and said depression being in cooperating relative positions when the ratings of said pair of current carrying elements are the same, and said protrusion defeating mechanical and electrical engagement when the ratings of said pair of current carrying elements are different.

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