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LATCH INSULATION FOR QUICK BREAK CIRCUIT BREAKERS

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FIG. 1.

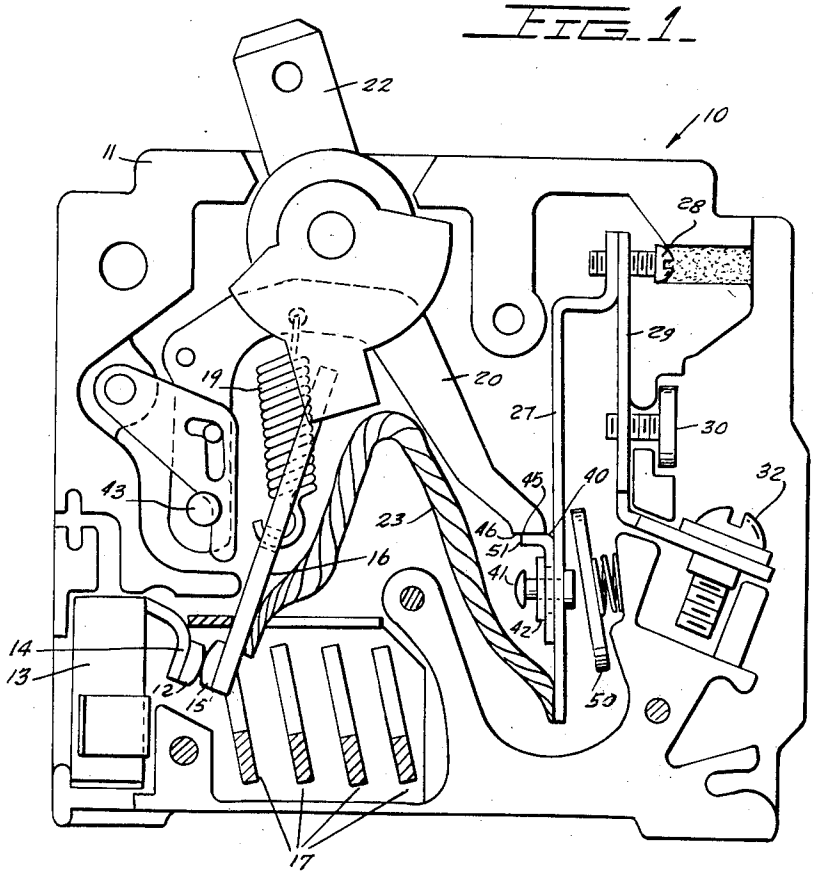
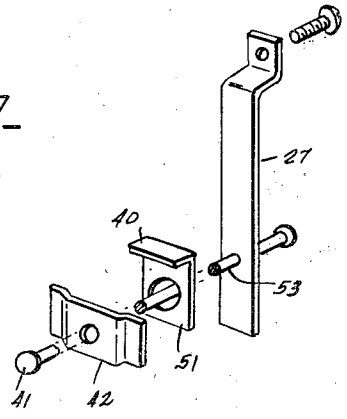


FIG. 2.



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LATCH INSULATION FOR QUICK BREAK CIRCUIT BREAKERS

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My invention relates to quick break circuit breakers and is more particularly directed to a novel arrangement and method whereby an insulated latch prevents parallel current flow from the bimetallic trip unit through the cradle mechanism of the circuit breaker.

In the prior art, the metallic latch member is insulated from the bimetallic element by sandwiching a piece of fish paper between the latch and the bimetallic element. In this arrangement, it was also necessary to provide some insulation for the metallic rivet which secured the metallic latch to the bimetallic trip unit. However, the fish paper type of insulation has the disadvantage of complicating the assembly of the quick break circuit breaker and thus increasing the cost of the final article.

That is, since it is necessary for the assembler to perform the additional operation of placing the fish paper between the latch and insuring that it is properly positioned, the added time and material result in a considerable increase of the assembly costs of this relatively inexpensive breaker.

It is noted that since the latch member must have a relatively strong surface to hold and maintain the cradle in latched position, it is necessary that the surface thereof be hard and hence, must be a metallic member.

In my novel arrangement and method, I provide a light coat of chromic oxide film on the latch member which serves to insulate this unit from the bimetal to which it is attached. The rivet which is used to secure the latch member to the bimetallic element can be also provided with a layer of chromic oxide to insure complete insulation between the bimetallic member and the latch member and thereby prevent a parallel path of current flow through the cradle mechanism.

Accordingly, a primary object of my invention is to provide a novel arrangement for quick break circuit breakers in which the insulation between the cradle mechanism and the bimetallic element results from the characteristics of the latch member.

Another object of my invention is to provide a quick break circuit breaker in which the parallel path comprising the bimetal, latch member and cradle will not conduct current due to an oxide coating on the latch member.

Still another object of my invention is to provide a latch member which insulates the bimetal from the cradle without the necessity of providing additional insulation means.

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

Figure 1 is a side view of the operating mechanism of a quick break circuit breaker to which my invention is particularly adaptable. This figure illustrates the position of the components when the circuit breaker is in the fully closed position with latch engagement between the cradle and the latch member.

Figure 2 is an exploded perspective view illustrating the relationship and connection of the bimetallic element, the latch member, and the armature by means of metallic rivet. This figure illustrates a modification of my invention which can be used when a non-oxidized or non-plastic rivet is used.

The circuit breaker **10** is provided with a molded housing **11** having its various components side mounted in appropriate grooves and recesses thereof. The stationary contact **12** is electrically connected to the female terminal **13** by the terminal conductor **14**. The movable contact **15** is secured to the contact arm **16**. An arc chute **17** is provided to extinguish between the arc created by the separation of the movable contact **15** from the stationary contact **12**.

The spring **19** connected at one end to the movable contact arm **16** and at its other end to the U-shaped cradle member **20** maintains contact pressure. That is, the movable contact **16** is pivoted in grooves in the bottom portion of the circuit breaker handle **22** and hence, the spring **19** will bias the contact arm toward the left.

A pigtail **23** is brazed at one end **24** to the movable contact arm **16** and at the other end **26** to the lower portion of the bimetallic element **27**. The bimetallic element **27** at its upper end is brazed to the terminal member **29**. Screw **28** is in threaded engagement with bimetal **27** and terminal **29** to provide calibration adjustment. The terminal member **29** is seated in the recess **30** of the molded housing **11** and has a terminal connecting portion **32**. Thus, the normal flow of current through the quick break circuit breaker is as follows: From terminal connector **32** through terminal **29**, screw **28**, bimetallic element **27**, through its end **26** to the pigtail **23** and from connection **24** to the movable contact arm through the movable contact **15** to the stationary contact **12** through conductor **14** to the other terminal **13** of the circuit breaker.

An L-shaped latch member **40** is secured to the bimetallic element **27** by means of the rivet **41**. The rivet **41** also secures the armature **42** to the bimetal **27**. A cradle **20** is rotatably mounted on the permanent pivot **43**. Thus, as shown in Figure 1, the cradle **20** although biased in a clockwise direction around the pivot **43** is prevented from rotating due to the engagement of the cradle surface **45** with the latch surface **46** of the L-shaped latch member **40**.

On the occurrence of an overcurrent, the bottom portion of the bimetal **27** will deflect to the right thereby releasing the latch engagement **45**, **46** of the cradle **20**. In the event a severe short circuit occurs, the armature **42** will be attracted toward the magnet **50** thereby moving the bottom portion of the bimetal **27** to the right to thereby release the latch engagement **45**, **46**. When the latch **45**, **46** is disengaged either by the time delay trip of the deflection of bimetal **27** or due to instantaneous trip due to the attraction of the armature **42** to the magnet **50**, spring **19** will rotate the cradle **20** around its pivot **43** thereby placing the spring **19** on the right side of the contact arm **16** and effecting disengagement of the cooperating contacts **12** and **15**.

However, when the contacts are in engagement and the cradle **20** is latched to the member **40** at **45**, **46**, an alternate parallel path for the load current exists as follows: from the bimetal **27** to the latch member **40** either directly or through the metal rivet **41** to the cradle **20** thence to the contact arm **16** either directly or through the spring **19** to the movable contact **15**. However, since these components are not designed to carry the load current, it is highly undesirable to have this parallel path exist for current flow.

Hence, my invention is directed to a novel arrangement whereby the bimetallic element **27** will be insulated from the cradle **20**.

The prior art method mentioned in the introduction of this specification provided the sandwiching of a piece of fish paper between the L-shaped latch member **40** and the bimetal **27** with an insulating sleeve over the rivet **41** to thereby prevent any current flow from the bimetal **27** to the latch member **40**. However, this method, as noted in the introduction, is highly undesirable and my invention is particularly directed to a novel insulating arrangement which overcomes the prior art disadvantages.

In my novel arrangement, the latch member **40** is provided with a light coat of chromic oxide. This is done as follows:

The latch member **40** is a stainless steel member with high chrome content such as a stainless steel member **40**. It is possible to heat treat this material and form a chromic oxide which is a good insulator. The chromic oxide coat is achieved by placing the high chrome content stainless steel latch member **40** in a standard type furnace, such as the Lindberg furnace, using a ratio of 4.5 air to 1.0 gas for the atmosphere. The stainless

steel member which is to be used for the latch member **40** is heat treated to between 850 and 875 degrees Fahrenheit for thirty minutes and then allowed to cool in a chamber under the atmosphere present. This operation forms a light coat of chromic oxide and also hardens the stainless steel thereby providing a very good latching surface.

It will be noted that the latch member **40** can also be obtained with the characteristics just described in connection with stainless steel members by starting with a piece of metal which has high hardness and then coating same either by oxidizing or other means with an insulation film.

It will be noted that even though the latch surface **46** of the latch member **40** is polished to provide a smooth surface for engagement with portion **45** of the latch **20** that the insulation characteristics of the latch member will be retained. That is, since the latch surface **46** does not come into contact with the bimetallic element **27**, the chromic oxide coating thereon can be removed without affecting the insulating characteristics between the bimetal **27** and the cradle **20**.

Although the surface **51** of the latch member **40** which engages the bimetal **27** is a chromic oxide coating to thereby prevent direct current flow from the bimetal to the latch member, it will also be necessary to provide means to prevent current flow from the bimetal **27** through the rivet **41** of the latch member **40**. This can be achieved in any one of a number of ways.

The first method is to provide a rivet **41** which has an oxide coating placed thereon similar to the manner above described in connection with the latch member **40**. Hence, the insulation characteristics will be the result of the coating and no current will be permitted to flow either directly from the bimetal to the latch member **40** or through the alternate path from the bimetal to the rivet of the latch member.

The second arrangement for preventing current flow through the rivet is to provide a plastic rivet **41**. Plastic rivets of the type having insulating characteristics to prevent current flow from the bimetal to the latch member are commercially available and easy to assemble.

The third method of preventing current flow from the bimetal to the latch member is illustrated in Figure 2. In this arrangement, the opening in the latch member **40** which receives the rivet **41** has a much larger diameter than the diameter of the shaft of the rivet. Thus, the rivet **41** will maintain the latch **40** sandwiched between the armature **42** and the bimetal **27** even though the shaft of the rivet **41** does not touch the latch member **40** due to its large opening **53**.

Thus, by providing an oversized hole **53** in the latch member **40**, it is still possible to use a standard metallic type rivet **41** since the surface **51** of the latch member **40** has an insulating coat to prevent direct current flow from the bimetal to the latch member.

Thus, it will be noted that with the particular design set forth above, the insulating coat **51** is provided on the latch **40** and not on the cradle **20**. However, the latching compounds on both the cradle **20** and the latch member **40** can be polished thereby eliminating any oxide coating which may be present.

As noted, it is possible to clean off the oxide on the latching surface **46** of the latch member **40** and still retain an insulated oxide coating **51** to form an insulator at the surface where the latch member **40** engages the bimetal **27**.

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 appending claims.

I claim:

1. A quick break circuit breaker having a molded housing and a pair of cooperating contacts having an engaged and disengaged position; latch means to maintain said cooperating contacts in engagement; said latch means comprising a cradle and a latch member; said latch member riveted to a bimetallic element of said quick break circuit breaker; said rivet and said latch member having an oxide coating to prevent current flow from said bimetal to said cradle.

2. A quick break circuit breaker having a molded housing and a pair of cooperating contacts having an engaged and disengaged position; latch means to maintain said cooperating contacts in engagement; said latch means comprising a cradle and a latch member; said latch member riveted to a bimetallic element of said quick break circuit breaker; said latch member having a chromic oxide coating; said rivet being a plastic material; said plastic rivet and said chromic oxide coating on said latch member preventing current flow from said bimetal to said cradle.

3. A quick break circuit breaker having a molded housing and a pair of cooperating contacts having an engaged and disengaged position; latch means to maintain said cooperating contacts in engagement; said latch means comprising a cradle and a latch member; said latch member having an opening to receive a rivet; said rivet securing said latch member to a bimetallic element of said quick break circuit breaker; the diameter of the opening of said latch member being larger than the diameter of the head of said rivet; said latch member being made of a high chrome content stainless steel having a chromic oxide coating; said rivet securing said latch member to said bimetal without engagement therewith; said opening and said chromic film of said latch member preventing current flow from said bimetal to said latch member.

4. A quick-break circuit breaker having a molded housing and a pair of cooperating contacts having an engaged and disengaged position; a latch means to maintain said cooperating contacts in said engaged position; said latch means comprising a cradle and a metal latch member; said metal latch being made of a high chrome content stainless steel having a chromic oxide coating thereon; said metal latch member secured to a bimetallic element of said circuit breaker by means of a rivet; said rivet being made of a high chrome content stainless steel having a chromic oxide coating; said rivet and said metal latch member providing a high resistance path between said bimetal and said cradle.

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