May 6, 1958 W. J. DRIVER 2,833,897

MEANS TO MINIMIZE FUSING OF CIRCUIT BREAKER CONTACTS

Filed Oct. 29, 1953

FIG. 1

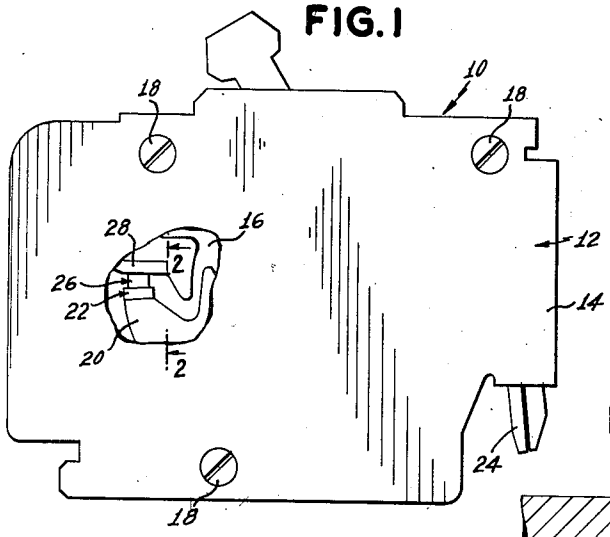


FIG. 2

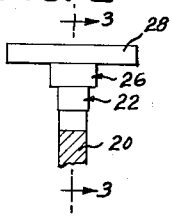


FIG. 3

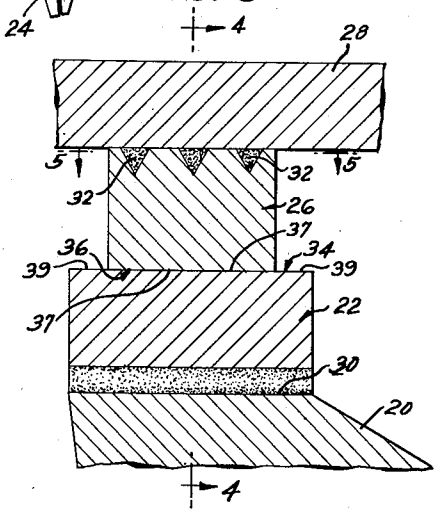


FIG. 4

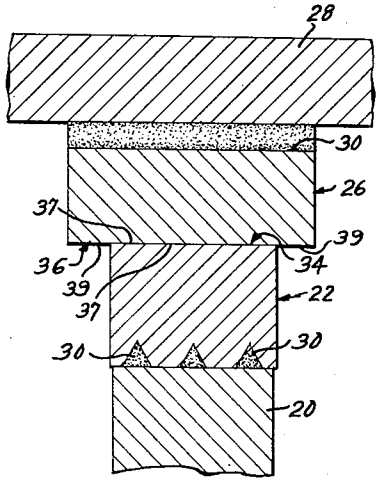
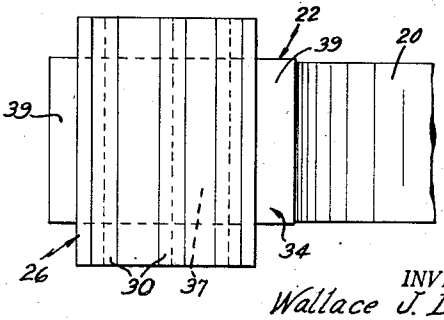


FIG. 5



INVENTOR.
Wallace J. Driver
BY Edwin Lenoch +
Harry Cole

ATTORNEYS

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MEANS TO MINIMIZE FUSING OF CIRCUIT BREAKER CONTACTS

Wallace J. Driver, Morristown, N. J., assignor to Federal Electric Products Company, Newark, N. J., a corporation of Delaware

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10 Claims. (Cl. 200—166)

The present invention relates generally to circuit breakers and, in particular, to an arrangement of the contacts thereof for minimizing the fusing of the contacts upon abnormal heating thereof.

In manually closing a circuit breaker, or a switch, the closing operation to effect the closing of the contacts should be smooth, even and positive, to provide a tight engagement of the cooperating contact surfaces when the breaker or switch is closed. Persons who are inexperienced or timid in the operation of circuit making and breaking devices often have a tendency to close the device with hesitation and timidity when engaging the contacts or when establishing or making the electric circuit. This type of closing operation is generally known in the art as "teasing" and, instead of providing a good tight engagement of the companion contacts, results in a comparatively loose contacting engagement thereof. Such a loose engagement of the contacting surfaces offers resistance to the current flow between the contacts and results in a greater degree of heating thereof than normally occurs where there is a good tight engagement of the contacts. Due to said heating, a superficial weld or fusing may occur between the faces of the contacting surfaces, which will tend to slow up, or possibly entirely prevent, the disengagement of the contacts in the event of an overload, as in an automatic circuit breaker, or may greatly add to the force which may normally be required to open the contacts in a manually operated circuit breaker or switch, or possibly prevent the manual opening thereof.

In accordance with the foregoing, an object of the present invention is the provision of a contact arrangement to minimize the fusing of the contacts despite a loose engagement thereof.

Another object is to provide a pair of contacts which are mutually disposed as not to have an overall face-to-face engagement of the contacting surfaces thereof, whereby to minimize or prevent the fusing of said contacts upon the abnormal heating thereof.

In accordance with the foregoing object, another object is the provision in a circuit breaker of a pair of cooperating contacts having rectangular contacting surfaces which are disposed to cross each other in the engaged condition thereof.

The above and other objects, features and advantages of the present invention will be more fully understood from the following description considered in connection with the accompanying illustrative drawings.

In the drawings which illustrate the best mode contemplated by me of carrying out my invention:

Fig. 1 is a side view of a circuit breaker, pursuant to the present invention, a portion of the housing being broken away for purposes of illustration;

Fig. 2 is a sectional view, on a larger scale, taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view, on a greatly enlarged scale, taken on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3; and

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 3.

Referring now to the drawings in detail, there is illustrated an automatic circuit breaker **10** of the general type illustrated and described in U. S. Patent No. 2,647,-186, issued July 28, 1953, to Thomas M. Cole and assigned to the assignee hereof. The breaker **10** is provided with a casing **12** which, as here shown, is constituted by a two-part insulation housing, formed by the complementary housing members **14** and **16** which are suitably secured together in housing defining relation, as by the bolts **18**. As illustrated and described in said patent, suitable circuit breaker mechanism is contained within the housing **12**, and said mechanism includes a movable contact or switch member **20** provided with the movable contact **22**, and in circuit with the terminal connector **24**. The movable contact or switch member **20** mounts said movable contact **22** for movement to engage and to disengage the companion stationary contact **26**, for making and breaking the circuit, respectively. The contact **26** is provided on a terminal member **28** which positions said contact for engagement by the companion movable contact **22**, as illustrated and described in said patent. The contacts **22** and **26** are each provided with suitable serrations, as at **30—30**, to facilitate the soldering of the contact to the switch member **20**, or to the terminal member **28**, as the case may be, as at **32**.

Pursuant to the present invention, provision is made to prevent an overall face-to-face contact engagement of the contacts **22** and **26**. As here shown, the contacts **22** and **26** are each provided with a substantially rectangular contacting surface **34** and **36**, respectively. As best illustrated in Figs. 3, 4 and 5, said contacting surfaces, in the engaged condition thereof, are mutually offset so that predetermined portions **37—37** thereof are in engagement, as best illustrated in Figs. 3 and 4, while the remaining portions **39—39** of said contacting surfaces are in disengagement from each other in the closed condition of the circuit breaker. More specifically, it will be noted from Fig. 5, that said contacts are mounted so that they cross each other in the closed condition of the circuit breaker, whereby the longitudinal axes of the respective contacting surfaces are mutually inclined.

I have found that the disposition of a pair of contacting surfaces, in mutually offset relationship in the engaged condition thereof, by preventing an overall face-to-face engagement of said contacting surfaces, minimizes the fusing or superficial welding of a pair of engaged contacts provided with said surfaces when said contacts are subjected to abnormal heating, such as the heating which occurs as a result of the added resistance to current flow between the contacts constituted by a loose engagement thereof. In spite of such a loose engagement or loose electrical contact of a pair of separable contacts, the portions of the contact surfaces which do not make contact in the closed condition of the breaker will tend to prevent the sticking of the contacts.

While the invention has been illustrated and described in connection with substantially rectangular contacting surfaces, it will be understood that it is within the scope of the present invention to provide contacting surfaces of other shapes and forms, whether symmetrical or otherwise, and to prevent the sticking of said surfaces by the mutual offsetting thereof in the engaged condition thereof.

While the invention has been illustrated and described in connection with an automatic circuit breaker, it will be understood that the present invention is equally applicable to other types of circuit breakers, for example and not by way of limitation, to manually operated switches.

The subject matter of the present application is related to the subject matter of the copending application of

George Wilinsky, Serial No. 9,449, filed simultaneously herewith and assigned to the assignee hereof.

While I have shown and described the preferred embodiments of my invention, it will be understood that various changes may be made in the idea or principles of the invention within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a circuit breaker having contact opening means automatically effective upon overload, a pair of substantially flat-faced contacts operated by said contact opening means and mounted for mutual relative movement to effect flatwise engagement and disengagement of contacting surfaces, respectively, thereof; that improvement which comprises the provision of a mounting arrangement for said contacts wherein said contacting surfaces are mutually disposed in the engaged condition thereof to prevent an overall face-to-face contact engagement of said surfaces, whereby to limit said contact engagement to predetermined portions of said surfaces, respectively, for minimizing the fusing of said contacts upon abnormal heating thereof.

2. In a circuit breaker having contact opening means automatically effective upon overload, a pair of substantially flat-faced contacts operated by said contact opening means and mounted for mutual relative movement to effect flatwise engagement and disengagement of contacting surfaces, respectively, thereof; that improvement which comprises the provision of a mounting arrangement for said contacts wherein said contacting surfaces are mutually disposed in the engaged condition thereof to prevent an overall face-to-face contact engagement of said surfaces, whereby to limit said contact engagement to predetermined portions of said surfaces, respectively, for minimizing the fusing of said contacts upon abnormal heating thereof, said arrangement comprising means mounting said surfaces so that they are mutually offset when engaged.

3. In a circuit breaker having contact opening means automatically effective upon overload, a pair of substantially flat-faced contacts operated by said contact opening means and mounted for mutual relative movement to effect flatwise engagement and disengagement of contacting surfaces, respectively, thereof; that improvement which comprises the provision of a mounting arrangement for said contacts wherein said contacting surfaces are mutually disposed in the engaged condition thereof to prevent an overall face-to-face contact engagement of said surfaces, whereby to limit said contact engagement to predetermined portions of said surfaces, respectively, for minimizing the fusing of said contacts upon abnormal heating thereof, said arrangement comprising means mounting said contacts so that said surfaces thereof cross each other in said engaged condition thereof.

4. In a circuit breaker, automatic overload-release means for separating the contacts thereof, a pair of companion contacts operated by said contact opening means and provided with substantially rectangular substantially flat contacting surfaces, said contacts being mounted for mutual relative movement to effect flatwise engagement and disengagement, respectively, of said surfaces, and said surfaces being mutually disposed in said engaged condition thereof so that their longitudinal axes are mutually inclined, whereby to minimize the fusing of said surfaces upon abnormal heating of said contacts.

5. In a circuit breaker, automatic overload-release means for separating the contacts thereof, a pair of companion contacts operated by said contact opening means and mounted for mutual relative movement to open and close said breaker, each contact having a substantially

planar contacting surface, and said surfaces being mutually disposed so that predetermined portions only thereof are in flatwise engagement in the closed condition of said breaker with the remaining portions of said surfaces in disengagement in said closed condition whereby to minimize the fusing of said surfaces upon abnormal heating of said contacts.

6. In a circuit breaker, automatic overload-release means for separating the contacts thereof, a pair of substantially flat contact surfaces operated by said contact opening means and mounted for mutual relative movement to effect flatwise engagement and disengagement thereof to open and close the breaker, said surfaces being mutually offset in said engaged condition thereof for minimizing the fusing thereof when abnormally heated.

7. A circuit breaker including a pair of contacts mounted for mutual engagement and disengagement for closing and opening a circuit having manual operating mechanism for moving the contacts into and out of engagement and further having automatic overload responsive means for automatically opening the circuit breaker, said contacts having substantially flat contact surfaces, said contacts being mounted for mutual flatwise engagement at a common contact area and each contact having a portion of the contact surface thereof extending beyond said contact area.

8. A circuit breaker including a pair of contacts mounted for mutual engagement and disengagement for closing and opening a circuit and having manual operating mechanism for moving the contacts into and out of engagement and further having automatic overload responsive means for automatically opening the circuit breaker, said contacts having elongated substantially flat contact surfaces, said contacts being mounted for mutual flatwise engagement at a common contact area, and each contact surface being disposed crosswise of the other contact surface and extending beyond said contact area.

9. A circuit breaker including a pair of contacts mounted for mutual engagement and disengagement for closing and opening a circuit and having manual operating mechanism for moving the contacts into and out of engagement and further having automatic overload responsive means for automatically opening the circuit breaker, said contacts having substantially flat rectangular contact surfaces, said contacts being mounted for mutual flatwise engagement at a common contact area and each contact having a portion of the rectangular contact surface thereof extending beyond said contact area.

10. A circuit breaker including a pair of contacts mounted for mutual engagement and disengagement for closing and opening a circuit and having manual operating mechanism for moving the contacts into and out of engagement and further having automatic overload responsive means for automatically opening the circuit breaker, said contacts having substantially flat relatively long and narrow rectangular contact surfaces, said contacts being mounted for mutual flatwise engagement at a common contact area and the rectangular contact surfaces being disposed crosswise of each other.

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