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2,237,283

ELECTRIC CIRCUIT BREAKER

Filed April 23, 1940

Fig. 1.

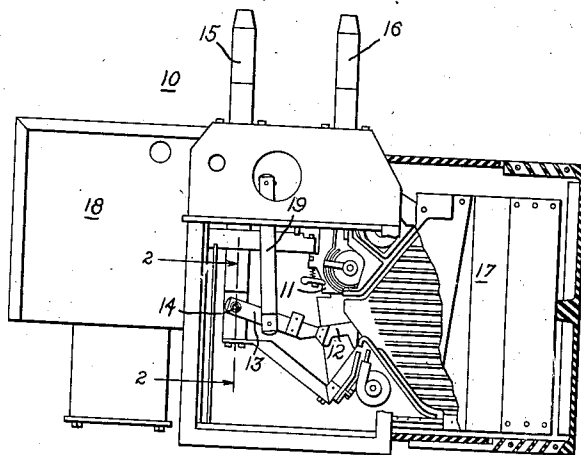
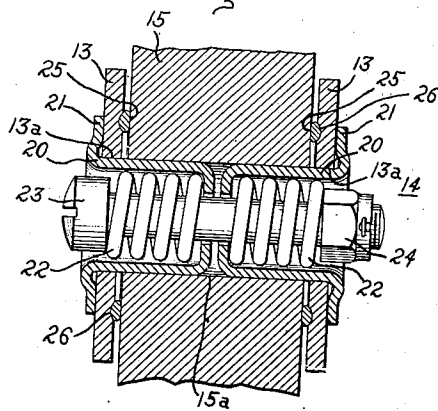


Fig. 2.



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ELECTRIC CIRCUIT BREAKER

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3 Claims. (Cl. 200—162)

Our invention relates to electric circuit breakers and more particularly to a pressure contact hinge for circuit breakers employing pivotally mounted switch blades.

Pivotally mounted switch blades have been used for a great many years and the prior art is replete with disclosures of arrangements for improving the hinge contacts of such switches. The main concern in pivotally mounted switch blades is that of providing good electrical contact at the hinge which becomes particularly important in circuit breakers where relatively large currents are carried since such hinge contacts are likely to be a source of difficulty. In order to improve the current-carrying capacity of such switches employing hinged switch blades, the contact areas of the hinged members were decreased and the contact pressure was increased. An arrangement of this type is disclosed and claimed in copending application of Weder et al., Serial No. 314,826, filed January 20, 1940, and assigned to the same assignee as the present application. In order to obtain the desired contact pressure at the hinge, switches heretofore have used the conventional convex-like phosphor-bronze spring washers which have given very satisfactory operation in connection with disconnecting switches and the like. Difficulties, however, have been encountered when using such washers at the contact hinge of high-speed circuit breakers employing a pivotally mounted switch blade. These difficulties are due to the fact that such spring washers have a very high pressure gradient, are easily overstressed and subject to permanent set particularly if they undergo a slight side play which is conceivable where operated rapidly and suddenly as in high-speed circuit breakers. In a high pressure-gradient spring, such as the spring washers referred to above, a slight amount of wear will cause large changes in the contact pressure and, hence, are unsatisfactory for use with high-speed circuit breakers intended for frequent operation and carrying relatively large currents. Such high pressure-gradient spring contact devices also require very critical initial adjustments to attain a predetermined contact pressure and, after such adjustment is made, checking by visual inspection is practically impossible. Then, too, if dismantled in the field for overhauling purposes, subsequent adjustment by inexperienced persons may vary considerably from the correct setting.

Accordingly, it is an object of our invention to provide a new and improved pressure contact hinge for circuit breakers employing pivotally

mounted switch blades which will overcome the disadvantages set forth above.

It is another object of our invention to provide a new and improved high pressure contact hinge for circuit breakers employing a pivotally mounted switch blade which is capable of carrying large currents efficiently, which is simple and compact, and which will give long and satisfactory service in all respects.

Further objects and advantages of our invention will become apparent as the following description proceeds and the features of novelty which characterize our invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of our invention, reference may be had to the following description taken in connection with the accompanying drawing in which Fig. 1 illustrates a circuit breaker embodying our invention and Fig. 2 is a sectional view taken on line 2—2 of Fig. 1 to illustrate the pressure contact hinge of our invention.

Although our invention is of general application in so far as pressure contact hinges for pivotally mounted switch blades are concerned, we have shown our invention as applied to an electric air circuit breaker of the type disclosed and broadly claimed in copending application, Serial No. 298,946, filed October 11, 1939, on behalf of Leonard J. Linde, and assigned to the assignee of the present application.

Referring now to Fig. 1, we have shown a circuit breaker 10 of the well-known drop-down type for use in a grounded metal enclosure or cubicle, not shown, wherein disconnection from the external electric circuit is effected merely by bodily lowering of the circuit breaker. Circuit breaker 10 includes a movable contact structure which comprises a fixed contact 11 and a movable contact 12 which is supported on a multiple knife blade or lever 13 pivotally mounted at pressure contact hinge 14 to the lower end of conductor stud 15. Fixed contact 11 is mounted to the lower end of conductor stud 16. Circuit breaker 10 also includes a suitable arc-extinguishing structure 17 and an actuating mechanism 18 which may be connected to pivotally mounted multiple blade or lever 13 through operating rod 19.

Referring now to Fig. 2 illustrating the pressure contact hinge 14 between stud 15 and movable multiple blade or lever 13, we have shown a pair of hinge pintles 20 comprising cup-shaped members each provided with a flanged lip 21. These cup-shaped members are arranged to be inserted in the cooperating openings 13a and 15a formed

in switch blades 13 and stud 15, respectively, so that the flanged lips 21 engage with the surfaces of switch blades 13. Coil springs 22 are inserted in the cup-shaped pintle members 20 and a suitable fastening means, such as bolt 23 including nut 24, is provided for stressing the springs 22 to give the desired contact pressure. It will be observed that a very compact pressure contact hinge is obtained by this arrangement since the spring members are contained within the pintle. The pressure contact hinge 14, therefore, requires no more space than the prior-art arrangement referred to above employing spring washers, and, at the same time, the advantage of a low gradient-pressure means is obtained.

In order to improve the current-carrying capacity of pressure contact hinge 14, we provide on one of the juxtapositioned surfaces of pivoted switch blades 13 or stud 15, contact surfaces 25 of restricted area formed of a material, such as silver, the oxide of which is physically and chemically unstable so as not to interfere with electrical current conduction. These contact surfaces 25 are preferably formed of an annular ring of silver which is placed in a shallow groove 26 and bonded to one of the juxtapositioned surfaces which contains the groove 26 by any suitable manner. An electric switch embodying such a raised restricted contact surface formed of a metal like silver is disclosed and broadly claimed in the above-mentioned copending application of Weder et al.

It will, therefore, be noted that we have provided a rugged and compact pressure contact hinge for a pivotally mounted switch blade for use in connection with high-speed circuit breakers carrying relatively large currents wherein the contact pressure by virtue of the low-gradient spring means employed will remain substantially constant irrespective of wear on the contact surfaces.

While we have described a particular embodiment of our invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from our invention and we, therefore, aim in the ap-

ended claims to cover all such changes and modifications as fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In a pivoted electrical connection, a current-conducting member, a current-carrying bar, means for pivotally mounting said bar to said current-conducting member to provide an electrical pressure contact therebetween comprising a cup-shaped pintle having a flange for engaging one of said members, a low pressure-gradient spring mounted within said pintle, and means cooperating with said spring for producing a substantially constant pressure between said current-conducting member and said bar.

2. In a high-speed electric circuit breaker, a hinge member, a blade member pivoted on said hinge by means of a cup-shaped pintle including a flange for engaging one of said members, a low pressure-gradient spring mounted within said pintle, and fastening means cooperating with said spring for producing a substantially constant pressure between the juxtapositioned surfaces of said members, one of said juxtapositioned surfaces being provided with a raised restricted contact surface formed of a metal whose oxide does not substantially interfere with electrical current conduction.

3. In an electric circuit breaker, a current-conducting member, a multiple-blade switch member, means for pivotally mounting said multiple-blade switch member to said current-conducting member to provide a pressure contact therebetween comprising a pair of cup-shaped pintles, each provided with a flange for engaging said multiple-blade switch member, a pair of low pressure-gradient springs mounted within said pintles, and means cooperating with said springs and pintles for producing a substantially constant pressure between said current-conducting member and said multiple-blade switch member.

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