Aug. 12, 1952 A. B. RYPINSKI 2,606,983

CIRCUIT INTERRUPTER CONTACT

Filed June 10, 1949

Fig. 1.

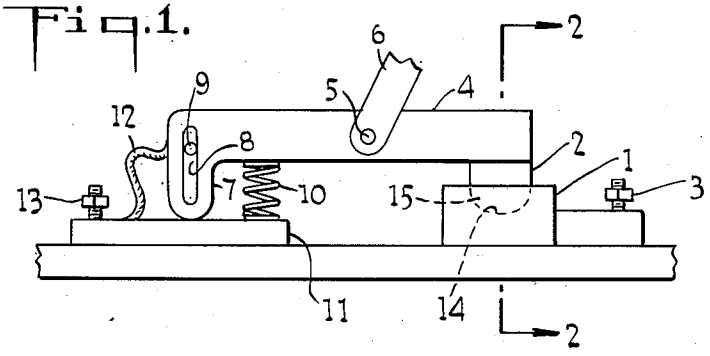


Fig. 2.

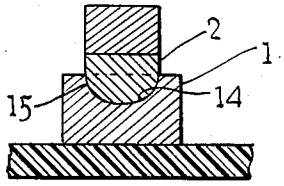


Fig. 3.

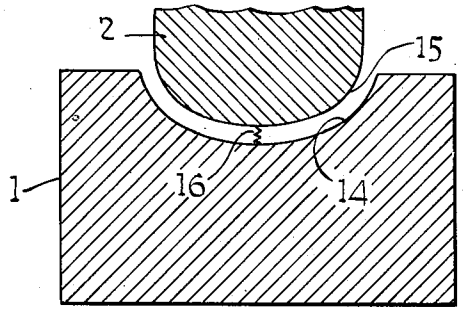
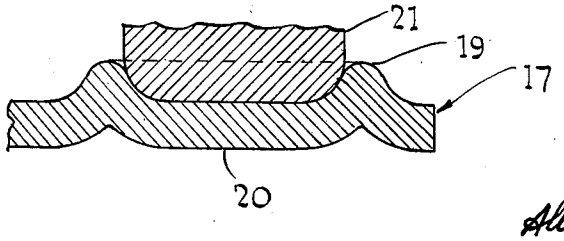


Fig. 4.



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CIRCUIT INTERRUPTER CONTACT

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2 Claims. (Cl. 200—166)

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The invention herein disclosed relates to an electric circuit interrupter and more particularly to an arrangement and construction of relatively movable contacts in a circuit interrupter.

The primary object of the invention is to provide a construction and arrangement of relatively movable contacts in an electric circuit interrupter by which wear of the contacts, on repeated interruption of abnormal currents, is materially and substantially reduced. Another object of the invention is to provide a construction and arrangement of such contacts such that relatively low melting point metals such as copper and brass may be satisfactorily employed for the contacts instead of the more expensive high melting point metals and alloys such as molybdenum and tungsten silver. A further object of the invention is to increase the useful life of such contacts.

The foregoing objects and certain advantages that will hereinafter appear are realized in the embodiment of the invention illustrated in the accompanying drawing and described in detail below.

The drawing includes:

Fig. 1 which is a side elevation of the contact arrangement of a circuit breaker of nominal, rated capacity, such for example as are used in homes and offices;

Fig. 2 which is a transverse, sectional elevation of the contacts, taken on the line 2—2 of Fig. 1;

Fig. 3 which is a section similar to Fig. 2, on enlarged scale, showing the contacts as they separate to interrupt a circuit; and

Fig. 4 which illustrates a modified form of the contacts.

Electric circuit interrupters of the kind herein referred to interrupt the circuit by the separation of relatively movable contacts. Certain such devices, such for example, as automatic circuit breakers, are required to interrupt or break a circuit under overload and short circuit conditions, i. e. interrupt current of ten or more times the normal full load capacity of the contacts. In fact, circuit breakers of fifty ampere capacity are subjected, in tests, to currents of five thousand amperes. On interrupting currents of ten or more times the normal capacity, arcing occurs between the contacts.

When such contacts, as commonly constructed and arranged, break a number of heavy arcs, the parts or sections of the contacts subjected to the arcs wear down due to the burning away of the metal. This burning action is most rapid at the edges of the contacts. This is due to the fact that there is less metal at the edges to absorb

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and dissipate the heat of the arc. Consequently, the edges of the contacts burn off first and the initially flat contacting surfaces become convexed. Experience has shown that when circuit breakers of a rated capacity of fifty amperes are subjected to currents of the order of five thousand amperes, the contacts are burned heavily on the first few separations and are rounded off at the edges.

I have found that by providing a recess in the engaging face of one of the contacts and shaping the other of the contacts complementary to the recess, the wear on the contacts is very materially and substantially reduced. If the contact having the recess therein be of greater surface area than the other, so that there is substantial metal about the recess, a greater contact life is attained, and the effects of arcs formed on the separation of the contacts is materially reduced where one of the contacts, that having the recess therein, has at least twice the area and mass as that which is considered normally acceptable.

In the arrangement shown in the drawing, there is a stationary contact 1 and a cooperating movable contact 2. The stationary contact has a binding post 3 associated therewith to which a wire may be connected. The movable contact 2 is secured to an arm 4 which at a point 5 is pivotally connected, between its ends, to an actuating lever 6, which is automatically actuated, by mechanism common and well known in the art, upon an overload or short circuit. At the end opposite the contact, the arm 4 has a lateral arm 7 through which there is an elongated, transverse slot 8. A fixed pin 9 extends through the slot 8, and a spring 10 between the arm 4 and a conducting base 11 biases the arm about the pivot 5 in a direction to close the contacts. This arrangement is provided to take up contact wear, and the permissible contact wear will be determined by the length of the slot 8. A flexible connection 12 carries current from the conducting base, which has a terminal 13 thereon, to the arm 4 and to the movable contact.

In the construction shown, the stationary contact 1 is at least twice the area and mass of a contact normally used with a circuit breaker of comparable ampere rating, An arcuate recess 14 is formed in the contacting surface. As will be seen from Figs. 1 and 2, the recess has substantial depth, and there is a substantial amount of metal about the recess. The movable contact has a convexed contacting end portion or surface 15 that is complementary to the recess and that is received in the recess.

With this arrangement and construction of

contacts, there are no edges to be readily burned away and there is a comparatively large area of both contacts touching in the closed position of the contacts. This is a very desirable condition and burning of the contacts is reduced to a minimum, there is no concentration of arcing at the contacting surface. Thus, as seen in Fig. 3, where the movable contact 2 is separating from the contact 1, an arc 16 is carrying current between the contacts. The arc is in a narrow, confined space, and in every direction, it is enclosed by relatively large masses of metal tending to cool the arc. If the arc succeeds in burning away metal at its points of engagement with the contacts, the distance it must cross is increased and it has a tendency to move to a shorter path. There may, of course, be several arcs simultaneously in the arcing space. The narrow gap and lack of edges tend to equalize the temperatures within the gap.

In Fig. 4 of the drawing, there is illustrated another form for the contacts. With this arrangement, the stationary contact 17 is shaped from a flat bar of metal of approximately one-eighth of an inch thick. The recess 18 is produced by raising a circumambient wall 19 all around the area of the recess. Thus, the bottom or back 20 of the contact is in the same plane as the flat bar. From Fig. 4, it will be seen that the recess need not be arcuate; a dish-shaped contact with a complementary surface on the engaging, cooperating contact 21 provides the characteristics inherent in the invention.

From the foregoing description of the embodiment of the invention illustrated in the drawing, it will be apparent to those skilled in the art that by this invention there is provided an arrangement and construction of contacts in an electric circuit interrupter with which wear of the contacts is materially reduced, with which inexpensive, low melting point metals may be used for the contacts; with which the useful life of the contacts is materially increased; and with which there is materially less emission of flame and molten particles and less mechanical violence and noise on short circuit.

It will be obvious that various changes may be made by those skilled in the art in the details of the embodiment of the invention illustrated in the drawing and described above within the principle and scope of the invention as expressed in the appended claims.

I claim:

1. In a circuit breaker of the kind described, the combination comprising a movable contact arm, a contact fixed to the movable contact arm, a stationary contact positioned to be engaged by said contact fixed to the movable arm in one position of the arm, one of said contacts being flat and having a recess in the engaging face thereof and the other of said contacts having an engaging surface complementary to and engageable with the surface of said recess, the contact with the recess therein being characterized by the fact that it has a greater surface area than the other contact, is of greater length and width than the recess therein, and is a least twice the area and the mass normally used in a contact with a circuit breaker of comparable ampere rating.

2. In a circuit breaker of the kind described, the combination comprising a movable contact arm, a contact having a convexed contacting surface fixed to the movable contact arm, and a flat, stationary contact positioned to be engaged by the contact fixed to the movable contact arm, in one position of the arm, the stationary contact having a recess in the contacting face thereof complementary to the convexed contacting surface of the contact fixed to the movable arm and being characterized by the fact that it has a greater length and width than the recess therein, has a greater surface area than the contact fixed to the movable arm, and is at least twice the area and mass normally used with a circuit breaker of comparable ampere rating.

ALBERT B. RYPINSKI.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,052,987	Weed	Feb. 11, 1913
1,100,949	Briggs	June 23, 1914
1,205,549	Kruesheld	Nov. 21, 1916
1,223,143	Briggs	Apr. 17, 1917
1,662,344	Soreng	Mar. 13, 1928
1,740,535	Bramming	Dec. 24, 1929
2,261,008	Van Sickle et al.	Oct. 28, 1941
2,436,290	Cole	Feb. 17, 1948
2,538,245	Hiller	Jan. 16, 1951