

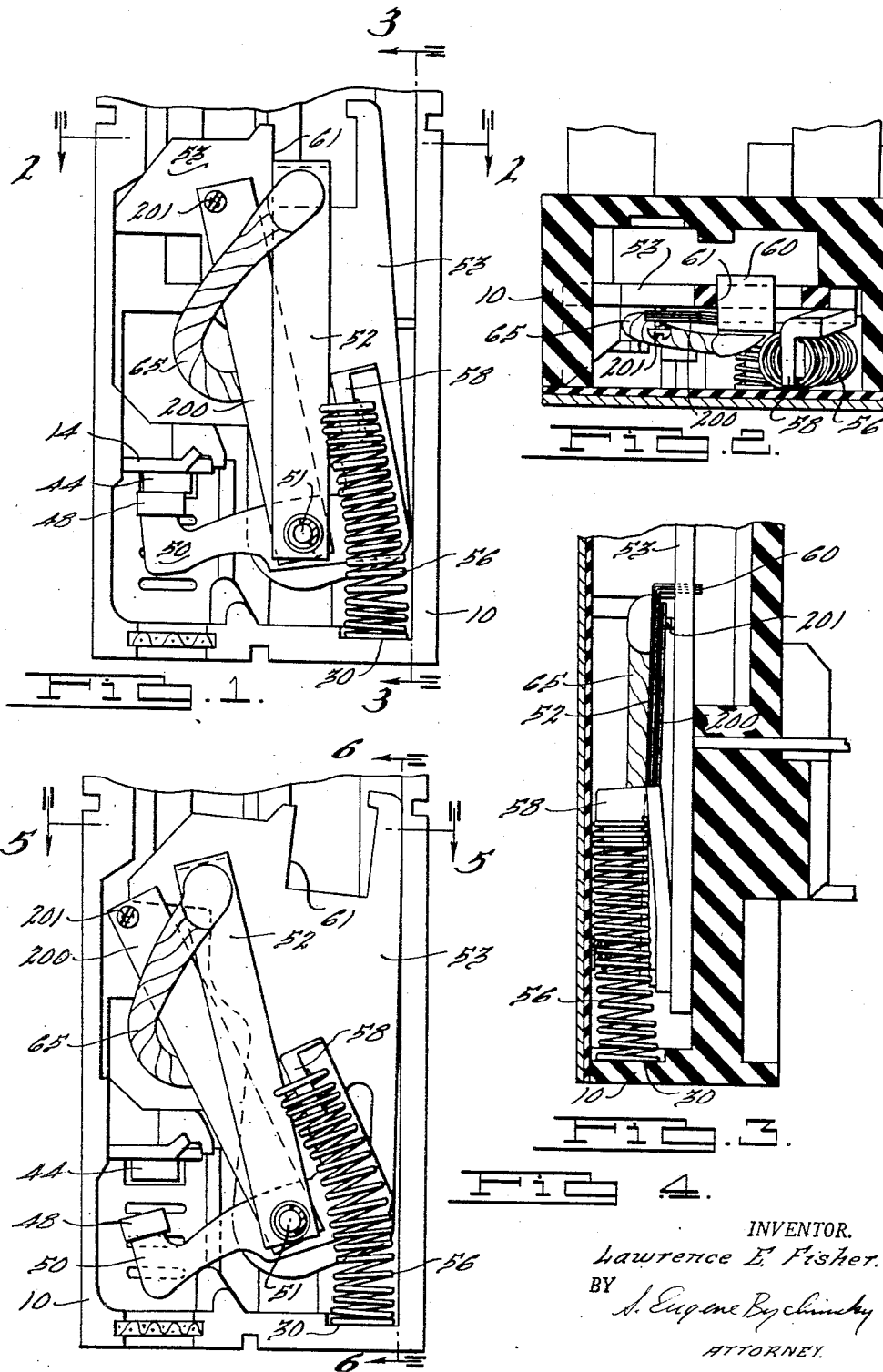
Dec. 18, 1951

L. E. FISHER
CIRCUIT BREAKER

2,579,252

Filed Feb. 5, 1945

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

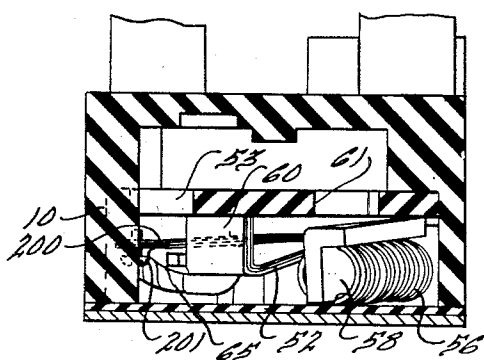


FIG. 5.

FIG. 6.

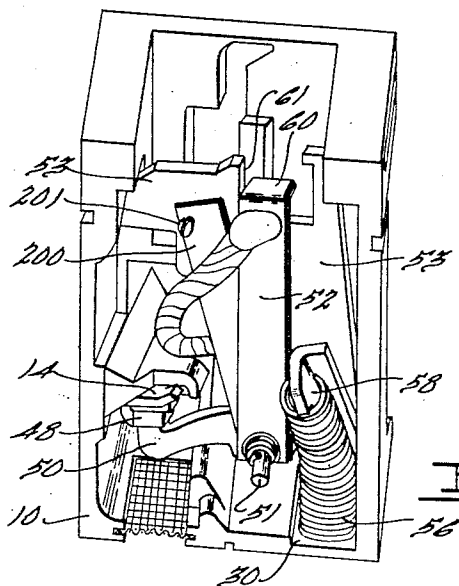
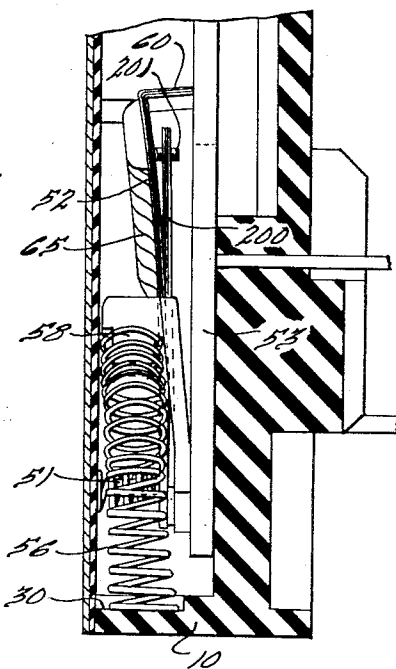


FIG. 7.

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CIRCUIT BREAKER

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3 Claims. (Cl. 200—116)

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This application relates to overload release circuit breakers, generally, and more specifically concerns an improved overload release mechanism that is particularly adaptable to the type circuit breaker disclosed in U. S. Patent No. 2,385,727 issued on September 25, 1945, to Elwood T. Platz.

In the type of circuit breaker described in the aforementioned patent, the release mechanism includes a releasable latch consisting of a bimetal latching element having a portion thereof arranged in overlapping relation with an abutment. On the occurrence of a temperature rise such as would be occasioned by an overload in the circuit, the overlapping portion of the bimetal tends to work away from the abutment and, being spring loaded, frees itself from the abutment to thereby release a contactor. In such devices the latching element tends to work away from the abutment on any temperature rise, regardless of whether that temperature rise is caused by ambient temperature, by heating due to prolonged moderate overload, or by a momentary excessive overload in the controlled circuit. As release characteristics are dependent, among other things, upon the amount of overlap between the bimetal and the abutment, it is desirable to prevent the overlap from changing except on temperature rise occasioned by overload. Since the amount of overlap also affects the speed of opening of the circuit breaker and as it is desirable to have the circuit opened rapidly on the occurrence of an excessive overload of large magnitude, it is also desirable to have as small an amount of overlap as possible.

In order to obtain faster opening than is possible in circuit breakers having bimetal latching elements alone, an over-controlling magnetic release has been supplied in circuit breakers which release is adjusted to cause faster release in the desired range of overload. See for example, co-pending application Serial No. 724,430, filed on January 25, 1947, in the names of William H. Frank, Elwood T. Platz, and Russell S. Davis, and assigned to the assignee of the present application. However, such combinations require more space and materials and are more expensive to produce than the type using only bimetallic elements. Moreover, the effects of ambient temperature on the bimetal elements of the known combinations, acts to alter the speed of release in the range of overloads when release is effected by working of the bimetal elements in the release direction.

Therefore, a primary feature of the present in-

vention is the provision of a novel latching arrangement for circuit breaker, that permits a wide range of choice of release characteristics. A further feature of the present invention is the provision of a bimetal latching arrangement for a circuit breaker that maintains a predetermined release characteristic irrespective of variations of the ambient temperature at the circuit breaker. A further feature is in the provision of an improved bimetal latching arrangement for circuit breakers that provides a very quick trip when the circuit breaker is closed on an existing overload. A still further feature of the present invention resides in the provision of a bimetal latching arrangement wherein two bimetals are provided and they are arranged to provide slow release on moderate overloads and quick release on excessive overloads. These and other features of the present invention will become apparent from the description of the drawings wherein:

Fig. 1 is a fragmentary view of the circuit breaker in a closed position and including a preferred embodiment of the present invention.

Fig. 2 is a view along the lines A—A of Fig. 1.

Fig. 3 is a view along the lines of B—B of Fig. 1.

Fig. 4 is a fragmentary view of the circuit breaker of Fig. 1 in a tripped, or opened circuit position.

Fig. 5 is a view along the lines C—C of Fig. 4.

Fig. 6 is a view along the lines D—D of Fig. 4.

Fig. 7 is a perspective of the circuit breaker of Fig. 1.

Referring now to Fig. 1 of the drawings, the circuit breaker mechanism is illustrated as being enclosed in a case 10, and as having a construction and mechanism, the major parts of which, are much similar to the mechanism of the aforementioned Patent No. 2,385,727. This construction and mechanism includes the line terminal 14 secured to the case 10, and arranged to support the stationary contact 44. A movable contactor 50, carrying the contact 48, is pivoted by the rivet 51 to permit the contact 48 to make butt contact with the stationary contact 44. The movable contactor 50 has an L-shaped portion having a lug 58 for holding compression spring 56, which in turn is seated in the spring seat 30 of casing 10. The spring 56 not only acts to coerce the movable contactor 50 in a counterclockwise direction, but also serves to coerce the lug 58 and the movable contactor 50 toward the insulation holding plate 52. Also as in the aforementioned patent, rigidly secured to the movable contact 50, by means of the rivet 51, is a bimetallic latching element 52, which, in the

latched position illustrated in Figs. 1, 2, and 3, has a hook 60, formed of an edge thereof, abutting against the abutment edge 61 formed of the insulation holding plate 53. As the spring 56 tends to coerce the movable contactor 50 towards the insulating holding plate 53, it also tends to force the bimetal 52 towards the plate 53. In order that the bimetal 52 may be sensitive to the amount of current through the circuit breaker, the current is transmitted through it, by means of the flexible loop 65, and thusly, when an overload occurs, heating takes place in the bimetallic strip 52 and it tends to warp away from the plate 53. However, the spring 56 also tends to force the hook 60 to the right, as viewed in Fig. 3. Hence the amount of overlap of the hook 60 on the abutment edge 61 of plate 53 is determined by the adjusting screw 201, which is carried by member 200 rigidly secured to moveable contact 50 by rivet 51. The hook 60 of bimetal 52 must warp the amount of the overlap in order to be freed of the abutment edge 61. In other words, the current passing through the bimetal element 52, must be of a value (on overload) to heat the element 52 to cause it to warp an amount sufficient to move the hook 60 (to the left as viewed in Fig. 3) free of the abutment edge 61, whereupon the spring 56 moves the movable contact and its associated elements 52 and 200 to the tripped or open circuit position illustrated in Figs. 4, 5, and 6.

From the above description, it can be seen that the position of the adjusting screw 201 determines the distance that the hook 60 must travel away from the plate 53, before the circuit breaker will trip to the open circuit position. As the spring 56 coerces the bimetal 52 and the hook 60 toward the plate 53, the screw 201, in resting on the plate 53, limits the amount which the hook 60 will enter the abutment edge 61.

By the same token that the bimetal 52 will warp when heated by excessive current passing through it, it will also warp when subjected to the ambient temperature of the surrounding atmosphere. As this variation would act to alter the amount of overlap on the hook 60 on the abutment edge 61, and hence vary the timing and other characteristics of the circuit breaker, means for compensation for the ambient temperature is provided by constructing the element 200 of a bimetallic temperature responsive material. By this construction, as the bimetallic strip 52 tends to warp and alter its release characteristics through altering the amount of overlap between the hook 60 and the abutment edge 61, as the second bimetal element 200 also tends to warp, in response to ambient temperature, in the same direction, the original gap between the hook 60 and the abutment edge 61 is maintained. Thus, the ambient temperature effect on the strip 52 is effectively eliminated under those conditions wherein much elimination is desirable but when quick release is desirable, such as, for example, would occur in the event the breaker were to be closed on an existing short circuit, the time response of the strip 52 is so fast that the ambient temperature compensating strip 200 does not

have time to operate. Hence the strip 52 may be considered a quick or rapid acting bimetal, while the strip 200 a slow acting bimetal.

In addition to maintaining the proper release characteristics notwithstanding ambient temperature variations, a further advantage is derived from the construction set forth. If an attempt is made to close, or latch the breaker on an existing overload, the strip 52 will be caused to heat and warp, but this condition will not be transmitted to the strip 200, as the time element is too short to permit heat transfer and subsequent warping of bimetal strip 200. Thus, the strip 200 not only derives one advantage from being positioned close to the bimetal strip 52, whereby the ambient temperature of the strip 52 will be accurately reflected in the strip 200, but also this proximity does not become a disadvantage, upon the occurrence of an excessive overload.

I claim:

1. In an overload release circuit breaker, a fixed contact, a movable contact, a member carrying said movable contact and mounted to move the latter into and out of engagement with said fixed contact, means urging said member in a direction to separate said contacts, a bimetallic latching element secured to said member, an abutment arranged normally to block contact-opening movement of said latching element and said member, said latching element being in circuit with said contacts to be warped free of said abutment upon passage of an overload current, means urging said latching element in the direction of increased overlap with respect to said abutment, and a bimetallic ambient-temperature compensating element arranged adjacent said latching element and disposed to contact the same so as to maintain constant the amount of overlap between said latching element and said abutment irrespective of changes in ambient temperature.

2. The device in accordance with claim 1, in which a single spring constitutes the means for urging said member in contact-opening direction and the means for urging said latching element in the direction of increased overlap.

3. The device in accordance with claim 1, in which said compensating element is disposed in heat-receiving relation to said latching element whereby it will operate to slow down the unlatching movement of said latching element for moderate overloads without affecting the speed of unlatching movement for excessive overloads.

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Number	Name	Date
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2,455,753	Getchell	Dec. 7, 1948