Nov. 27, 1934. W. H. FRANK ET AL 1,982,289

CIRCUIT BREAKER

Filed Jan. 3, 1933

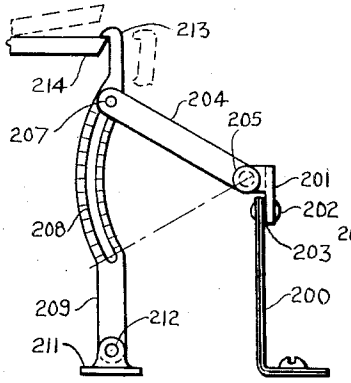

Fig- 3

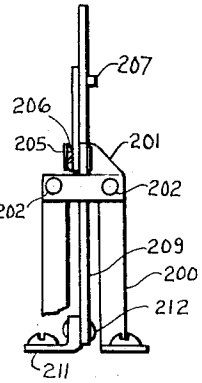

Fig- 4

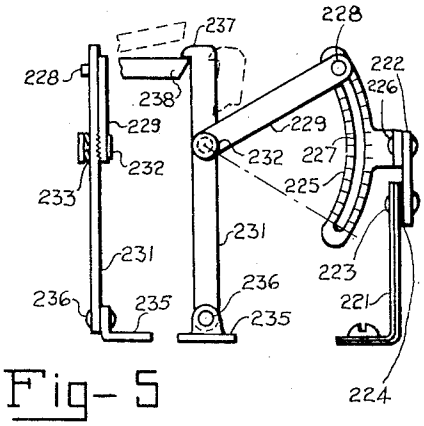

Fig- 5

Fig- 6

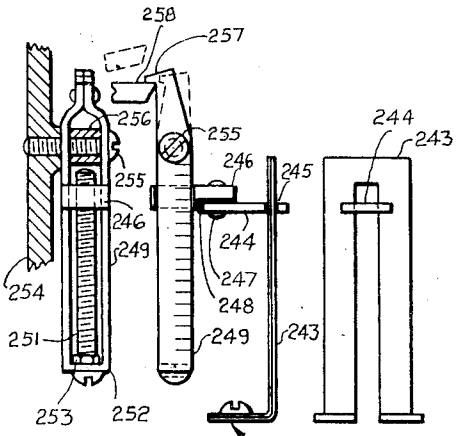

Fig- 7

Fig- 8

Fig- 9

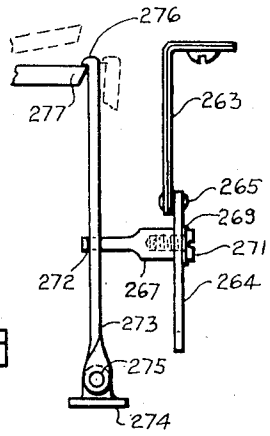

Fig- 1

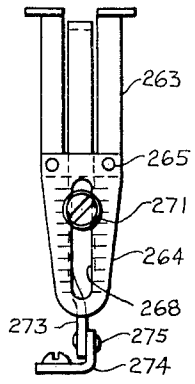

Fig- 2

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CIRCUIT BREAKER

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Application January 3, 1933, Serial No. 649,988

6 Claims. (Cl. 200—116)

The invention of this application relates to circuit breakers.

A principal object of the invention is to provide, for circuit breakers, novel forms of holding devices which may be calibrated, as desired by the operator, to release the circuit breaker at various overload amperages. More specifically, there are provided holding devices including fulcrumed holding levers connected to thermal warping elements by variable connections which constitute the calibration means, the connections being varied to vary the effects of the warping elements on the holding elements.

Still further objects of the invention will be readily apparent to those skilled in the art upon reference to the following detailed description of embodiments of the invention, the same to be read in connection with the appended drawing. Referring to the drawing, it will be seen that

Figs. 1 and 2 are elevation and end views of one form of holding device;

Figs. 3 and 4 are elevation and end views of another form of breaker holding device, shown in "On" (full lines) and overload "Off" (dash lines) positions;

Figs. 5 and 6 are similar views of still another form of breaker holding device;

Figs. 7, 8, and 9 show still another form of holding device in left end view, elevation view, and right end view, respectively.

In Figures 1 and 2, there is shown a device which consists of a U-shaped thermostatic or bimetallic warping element 263, whose legs are connected respectively to a contact element of a breaker and to a line. A bracket 264 is rigidly secured to warping element 263 by rivets 265 and is insulated therefrom. An arm 267 is slidably mounted in an elongated slot 268 of bracket 264, being clamped to the latter by a washer 269 and a screw 271 tapped into arm 267. The other end of arm 267 is grooved, at 272 so as to receive the edge of a latch 273 pivotally secured at its lower end to foot 274 by rivet 275. The upper end of latch 273 is provided with a hook 276 which holds pawl 277 firmly when the circuit breaker is in either "On" or normal "Off" position.

Under overload conditions the warping element 263 moves to the right. This motion is transmitted through arm 267 to latch 273, moving hook end 276 to release pawl 277.

The different positions of arm 267 in latch 273 vary the throw of latch 273 and therefore the device can be calibrated to release at various overload amperages, which can be indicated by graduations along a surface of bracket 264.

The holding device of Figures 3—4, consists of a U-shaped thermostatic or bimetallic warping element 200, one of whose legs may be connected to a contact element of a breaker and the other of whose legs may be connected to a line. A bracket 201 is rigidly secured to warping element 200 by rivets 202, there being insulation 203 between the element and the bracket. An arm 204 is pivotally connected to bracket 201 by a pin 205 provided with a lock washer 206 which maintains arm 204 in any desired position, relative to the element. A pin 207 on the outer or free end of arm 204, rides freely in a circular slot 208 of a latch 209 pivotally secured to a foot 211 by a rivet 212. A hook 213 on the upper end of latch 209 holds a breaker pawl 214 firmly when the breaker is in its "On" position or in its normal "Off" position.

When an overload occurs, the warping element 200 moves to the right. This motion is transmitted through arm 204 to latch 209, moving the hook end thereof to release pawl 214.

The different angular positions of arm 204 about pivot 205 vary the throw of end 213 of latch 209 and therefore the device can be calibrated to release at various overload amperages. To indicate these amperages, latch 209 can be graduated along the edge of elongated slot 208.

For reset, pawl 214 presses downward on end 213 of latch 209 forcing it to the right, when pawl 214 is in normal position, the end of latch 209 again snaps back to its normal position.

In Figures 5 and 6 there is shown a device which consists of a U-shaped thermostatic or bimetallic warping element 221, whose legs are connected respectively to a contact element of a breaker and to a line. A bracket 222 is rigidly secured to warping element 221 by rivets 223, there being insulation 224, between the element and the bracket. A sector 225 is rigidly fastened to bracket 222 by rivets 226, and is provided with an arcuate slot 227 in which rides a pin 228 rigidly connected to arm 229, which may be fixedly positioned radially within the limits of arcuate slot 227 in sector 225. The latter is pivotally connected to latch 231 by pin 232 provided with a lock washer 233. Latch 231 is pivotally connected at one end to foot 235 by rivet 236 and its other end is provided with a hook 237 which holds pawl 238 firmly, when the circuit breaker is in either "On" or normal "Off" positions.

Under overload conditions, the thermal element 221 moves to the right. This motion is

transmitted through arm 229 to latch 231, moving the hook end 237 to release pawl 238.

The different angular positions of arm 229 about pivot 232 vary the throw of end 237 of latch 231 and therefore the device can be calibrated to release the pawl at various overload amperages. These amperages can be indicated by graduations along the edge of elongated slot 227 in latch 225.

For reset, pawl 238 presses downward on end 237 of latch 231 forcing it to the right. When pawl 238 is in normal position, the end of latch 237 again snaps back in normal position.

In Figures 7, 8, and 9, there is shown a device which consists of a U-shaped thermostatic or bimetallic warping element 243, whose legs are connected respectively, to the contact element of a breaker and to a line. An arm 244 of insulation, and doubly grooved on its edges at 245 is slidably connected to warping element 243 and is rigidly secured to a slidable arm 246 by rivets 247, being insulated from arm 246 by insulation 248. The slidable arm 246 is doubly grooved on its edges to receive the sides of latch 249. Slidable arm 246 is tapped to receive adjusting screw 251 which passes through a hole in the end 252 of latch 249, there being a check nut 253 on screw 251, to check against and positively position slidable arm 246 in latch 249. The latter is pivotally connected to a frame part 254 of the breaker by a screw 255, surrounded by spacer 256. The upper end of latch 249 is provided with a hook 257 which holds pawl 258 firmly when the circuit breaker is in either "On" or normal "Off" positions.

Under overload conditions the warping element 243 moves to the left. This motion is transmitted through slidable arm 246 to latch 249, moving hook end 257 to release pawl 258.

The different positions of slidable arm 246 vary the throw of latch 249 and therefore the device can be calibrated to release at various overload amperages. These can be indicated by graduations along a surface of latch 249, substantially as shown.

Now having described various embodiments of the invention, selected by way of example, reference will be had to the appended drawing which determines the scope of the invention, it being understood that, except as set out in the claims, the invention is not to be limited to the embodiments disclosed.

We claim:

1. In a controlling device of the character described, latching means in the nature of a lever, thermally responsive means also in the nature of a lever, and affected by changes in circuit conditions, and a connection between the means whereby the latching means will be released by the effect of such changes on the thermally responsive means, the connection being movable so as to vary the leverage ratio of both of the means so that the release-causing effect of such changes on the latching means can be varied.

2. In a controlling device of the character described, latching means in the nature of a lever, thermally responsive means also in the nature of a lever, and thermally affected by changes in circuit conditions, and a connection between the means whereby the latching means will be released by the effect of such changes on the thermally responsive means, the connection being movable so as to vary the leverage ratio of one of the means so that the release-causing effect of such changes on the latching means can be varied.

3. In a controlling device of the character described, latching means in the nature of a lever, thermally responsive means also in the nature of a lever and thermally affected by changes in circuit conditions, and a connection between the means whereby the latching means will be released by the effect of such changes on the thermally responsive means, the connection being movable so as to vary the leverage ratio of the first mentioned one of the means so that the release-causing effect of such changes on the latching means can be varied.

4. In a controlling device of the character described, latching means in the nature of a lever, thermally responsive means also in the nature of a lever and thermally affected by changes in circuit conditions, and a connection between the means whereby the latching means will be released by the effect of such changes on the thermally responsive means, the connection being movable so as to vary the leverage ratio of the second mentioned one of the means so that the release-causing effect of such changes on the latching means can be varied.

5. In a controlling device of the character described, latching means in the nature of a lever, thermally responsive means thermally affected by changes in circuit conditions, and a connection between the means whereby the latching means will be released by the effect of such changes on the thermally responsive means, the connection being movable so as to vary the leverage ratio of the holding means so that the release-causing effect of such changes on the latching means will be varied.

6. In a controlling device of the character described, latching means, thermally responsive means in the nature of a lever and thermally affected by changes in circuit conditions, and a connection between the means whereby the latching means will be released by the effect of such changes on the thermally responsive means, the connection being movable so as to vary the leverage ratio of the second mentioned means so that the release-causing effect of such changes on the latching means will be varied.

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