March 21, 1950 J. D. BOLESKY 2,501,156

THERMOSTATIC LATCH TRIP CIRCUIT BREAKER

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FIG. 1.

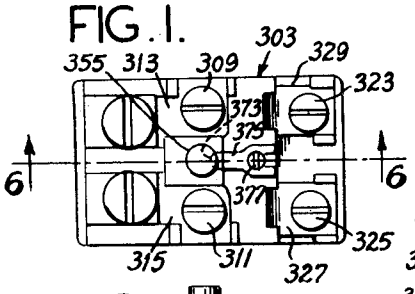


FIG. 2.

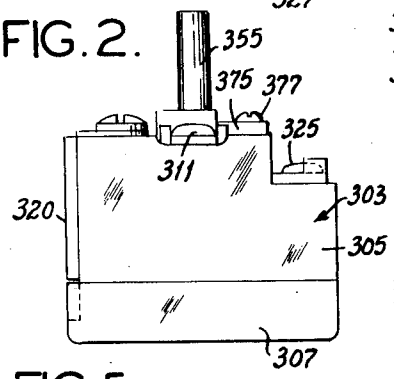


FIG. 3.

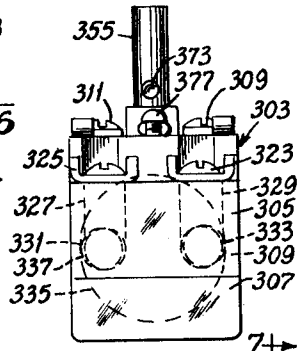


FIG. 4.

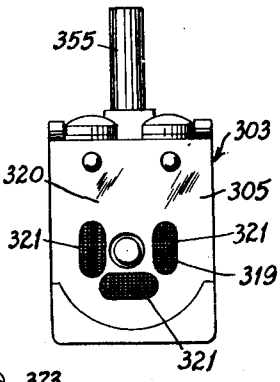


FIG. 5.

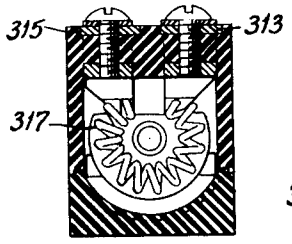


FIG. 6.

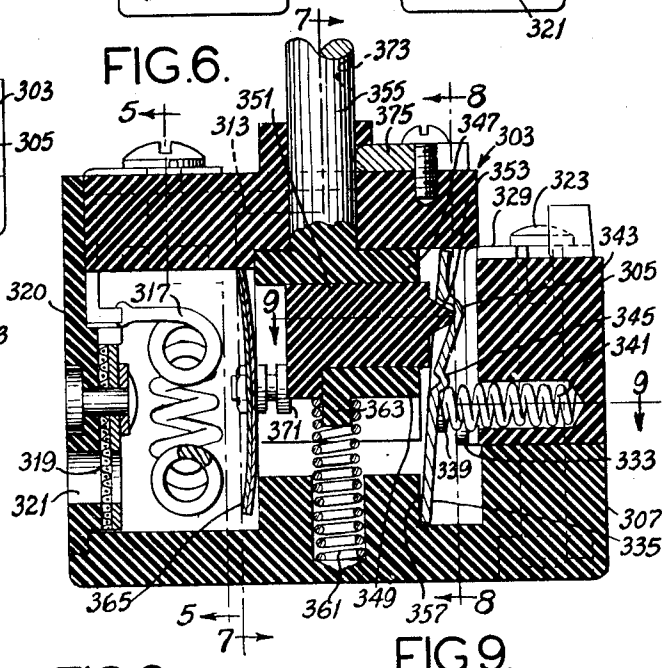


FIG. 7.

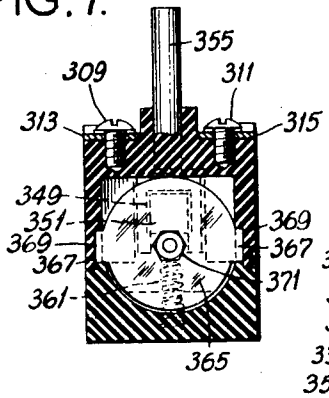


FIG. 8.

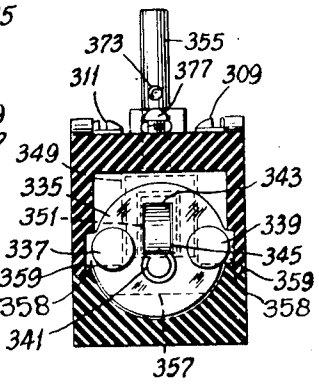
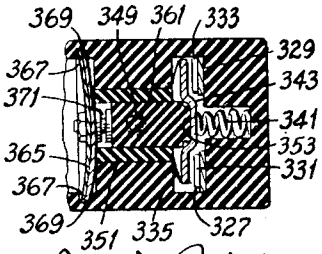


FIG. 9.



John D. Bolesky
Inventor
Haynes and Koenig
Attorneys

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FIG. 10.

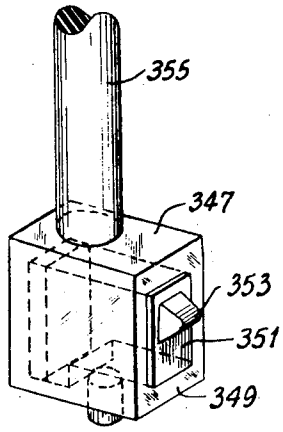


FIG. 11.

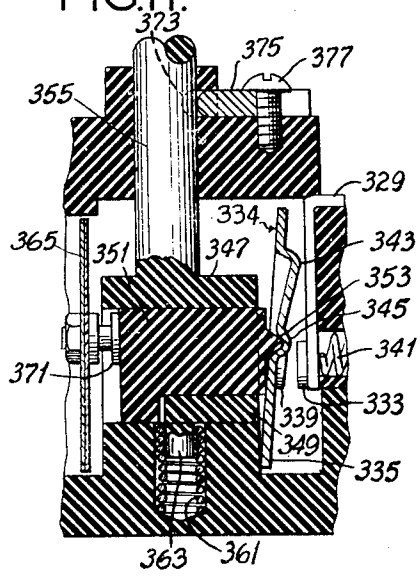


FIG. 12.

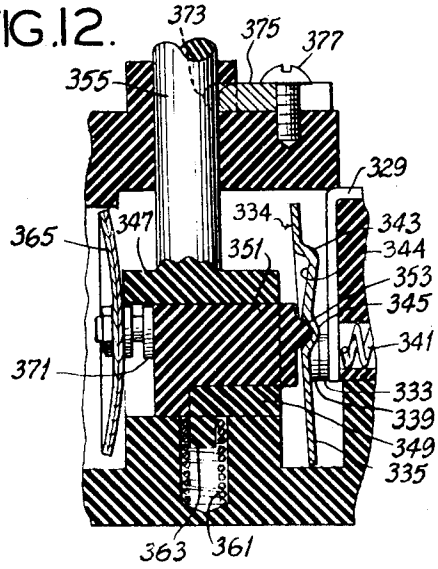
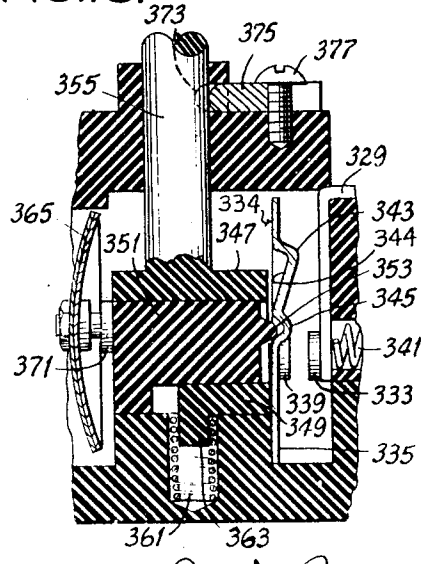


FIG. 13.



John D. Bolesky
Inventor
Haynes and Koenig
Attorneys

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UNITED STATES PATENT OFFICE

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THERMOSTATIC LATCH TRIP CIRCUIT BREAKER

John D. Bolesky, Mansfield, Ohio, assignor to Metals & Controls Corporation, Attleboro, Mass., a corporation of Massachusetts

Original application May 4, 1944, Serial No. 534,092. Divided and this application December 6, 1945, Serial No. 633,239

5 Claims. (Cl. 200—116)

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This invention relates to circuit breakers and more particularly to thermostatically controlled circuit breakers.

This application is a division of my copending application Serial No. 534,092, filed May 4, 1944.

Among the objects of this invention are the provision of an improved thermostatically controlled circuit breaker; the provision of a circuit breaker which is controlled by a thermostatic member, but does not rely upon the movement of contacts attached to said thermostatic member to interrupt a circuit; the provision of a circuit breaker controlled by a thermostat but in which the thermostat does not carry the current in the circuit; and the provision of circuit breakers of the type indicated which operate efficiently and which last for long periods of time. Other objects will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

Referring to the drawings in which is illustrated one of various possible embodiments of the present invention,

Fig. 1 is a top plan view of an embodiment of the invention;

Fig. 2 is a side elevation of the Fig. 1 embodiment;

Fig. 3 is a right-end elevation of the Fig. 1 embodiment;

Fig. 4 is a left-end elevation of the Fig. 1 embodiment;

Fig. 5 is a vertical section taken along the line 5—5 on Fig. 6;

Fig. 6 is an enlarged vertical section taken along the line 6—6 on Fig. 1;

Fig. 7 is a vertical section taken along the line 7—7 on Fig. 6;

Fig. 8 is a vertical section taken along the line 8—8 on Fig. 6;

Fig. 9 is a horizontal section taken along the line 9—9 on Fig. 6;

Fig. 10 is a perspective view of an operating member of the Fig. 1 embodiment;

Fig. 11 is a view similar to Fig. 6 but showing parts in different positions;

Fig. 12 is a view similar to Figs. 6 and 11 but showing parts in other operating positions; and,

Fig. 13 is a view similar to Figs. 6, 11 and 12 but showing parts in still other operating positions.

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Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings, a circuit breaker of this invention is shown to include a supporting case 303 consisting of two parts 305 and 307. The case is constructed of insulating material and has terminals 309 and 311. These are electrically connected through strips 313 and 315 to a heater 317. The heater is preferably screened from case 303 by an appropriate thermal insulation 319. Heat dissipating openings 321 are also provided in a detachable end plate 320 of case 303. Terminals 325 and 323 are likewise provided which are electrically connected by strips 327 and 329 to contacts 331 and 333, respectively. Contacts 331 and 333 comprise the fixed contacts of a switch, generally designated 334, having as its movable circuit making and breaking element a plate 335. The latter carries contacts 337 and 339 adapted to engage contacts 331 and 333, respectively, for making the circuit.

The plate 335 is mounted for floating movement within the case 303 as will be made clear. It is biased away from the fixed contacts 331 and 333 toward circuit breaking position by a spring 341 which reacts from the end wall of the case against the plate. The plate is indented as indicated at 343 to provide an inclined surface 344 for camming purposes. The surface 344 leads to latch detent notch 345 struck from the plate for receiving a latch element to be described.

A reset member 347 is provided for resetting the circuit breaker after it has tripped out upon overload. This member comprises a guide 349 disposed within the case 303 and mounted for vertical movement therein by means of a stem 355 which slides through an aperture in the top of the case. The stem projects out of the case for manual or other operation. The reset member is biased upward by a spring 361 to an off position determined by engagement of the guide with the top of the case. Spring 361 reacts from the bottom of the case against the bottom of the guide. The upper end of the spring surrounds a projecting part 363 of the guide to maintain the spring in alignment.

A switch-actuating latch 351 is carried by and guided for horizontal sliding movement in the guide 349. Thus, the latch is movable in the same general direction as plate 335. The end of the latch toward the plate has a projection 353 engaging the plate and adapted to enter detent 345 when the reset member is moved downward from its off position to an on position

against the bias of spring 361, thereby to latch the reset member in on position. The projection 353 is also adapted to function as a cam in cooperation with the inclined surface 344 of the plate to cam the plate to the right, as viewed in Fig. 6, to effect closure of the switch 334 when the reset member is moved downward to on position.

As illustrated, the switch plate 335 comprises a disc having laterally projecting ears 358 which slide in guide notches 359 formed in the side walls of case 303. Movement of the plate 335 in circuit-breaking direction is limited by engagement thereof with projection 353 and with a ridge 357 extending from the bottom wall of the case. Thus, the plate 335 is guided by ears 358 for floating movement toward and away from fixed contacts 331 and 333 and is biased away from these contacts by spring 341.

A snap-acting thermostatic disc 365 of the type shown in Spencer Patent 1,448,240 is mounted within the case 303 on the side of the latch 351 opposite the switch 334 and adjacent the heater 317 so as to be heated thereby. The thermostatic disc has laterally projecting tabs 367 fixed in notches 369 in the side walls of case 303 peripherally to hold the disc in position with its central portion free to snap in the direction of movement of latch 351 toward and away from the switch. The central portion of the disc 365 carries a button 371 which bears against the left end of the latch 351. The thermostatic disc, when below a predetermined temperature, is bowed toward the latch to maintain it in a position wherein its projection 353 is adapted to cam and hold the switch 334 closed and to latch in the detent 345. When the disc is heated above the stated predetermined temperature it snaps to a configuration wherein it is bowed away from latch 351, thus permitting the latter to move away from the switch 334. Upon cooling, the disc snaps back toward the detent element.

The reset member 347 may be latched in its closed position against the bias of spring 361 independently of latch 351 by an auxiliary latch member 375 carried on the top of case 303 adapted to enter a notch 373 in the stem 355. The latch member 375 is held on the top of the case by a screw 377 extending between forked arms of the latch member and threaded into the top wall of the case.

The operation of the circuit breaker is as follows:

It will be understood that heater 317 is connected into a circuit to be controlled by means of heater terminals 309 and 311 and that the switch 334 is connected into the circuit by means of terminals 323 and 325. Assuming that the various elements of the device originally are in their Fig. 6 positions wherein the reset member 347 is released and that latch member 375 is disengaged from notch 373, the switch 334 is closed by pushing in the stem 355 of the reset member. The switch-actuating latch 351 is held in its operative position by the thermostatic disc 365, which is bowed toward the latch. As the latch 351 is moved downward, its projection 353 engages the inclined cam follower surface 344 of the switch plate 335 to drive the plate 335 in circuit making direction against the bias of spring 341. When the projection 353 enters detent 345, contacts 337 and 339 on the switch plate are engaged with fixed contacts 331 and 333, thus completing the circuit through switch 334. Also, the reset member 347 is latched in its on position

against the bias of spring 361 by the engagement of the projection in detent 345. The circuit breaker elements are now in the position illustrated in Fig. 12.

Under overload circuit conditions, the overload current causes heater 317 to be heated to such temperature as to cause thermostatic disc 365 to snap to its bowed configuration opposite to that of Figs. 6 and 12. The disc, in snapping, momentarily assumes the flat condition of Fig. 11 and then its ultimate condition of Fig. 13 wherein it is bowed away from the latch 351. As the disc snaps to its hot position, the switch plate 335 and the latch 351 are driven to the left under the bias of spring 41. Plate 335 carries contacts 337 and 339 away from fixed contacts 331 and 333 to open switch 334 and to break the circuit controlled thereby. Also, since the forces tending to hold the latch projection 353 in the latch detent 345 are relieved, the spring 361 biases the reset member 347 upward to its released position of Fig. 6. When the thermostatic disc 365 cools sufficiently to snap back to its cold, bowed position, all the circuit breaker elements again assume their Fig. 6 position and the circuit breaker is conditioned for repetition of the operation.

Thus, the thermostatic disc 365 controls the switch-actuating latch 351 to maintain it in an operative position for holding the switch 334 closed and for latching the reset member 347 in on position under normal circuit conditions. When the disc is heated in response to overload, it causes the latch to be released for opening the switch and for releasing the reset member 347 to permit it to be returned to its released position of Fig. 6 under the bias of spring 361. While the disc 365 controls the making and breaking of the circuit, it does not carry the switch contacts and hence does not carry any current.

As above described, the circuit breaker functions as a manual reset circuit breaker. That is, once the circuit through switch 334 has been interrupted due to an overload, it is necessary to reset the circuit breaker to close the switch by pressing in the stem 355 of the manual reset member 347. In this connection, it will be noted that if an overload exists at the time the stem 355 is pressed in, thermostatic disc 365 will have assumed its bowed configuration opposite to that of Fig. 6 so that the switch-actuating latch 351 will be in its released position. Thus, the projection 353 will be ineffective to close the switch and latch the reset member 347 in on position and, upon release of the stem 355, the reset member 347 will snap upward to its off position.

The circuit breaker may be made to function as an automatically resetting circuit breaker by manually moving the reset member 347 to its on position and latching it in such position by engaging latch member 375 in the notch 373 in stem 355. Under these circumstances, the reset member 347 is retained in its on position of Figs. 11–13. Under normal circuit conditions, disc 365 will occupy its Fig. 12 position maintaining the switch 334 closed. Upon overload, the disc is heated by heater 317 and snaps to its Fig. 13 position to open the switch. When normal conditions are restored, the disc cools and automatically returns to its Fig. 12 position to close the switch.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above

construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a thermostatic circuit breaker, a switch including a movable circuit making and breaking element having a latch detent, means biasing said switch element to circuit breaking position, a reset member movable from an off to an on position, means biasing said reset member to off position, a switch-actuating latch carried by said reset member for movement therewith between its off and on positions, said latch being mounted for movement relative to said reset member toward and away from a latching position with respect to said detent releasably to latch the reset member in on position, said latch being adapted to hold said switch element in circuit making position against its biasing means when in its said latching position, and thermostatic means controlling said latch and movable in response to temperature change between a first position wherein it holds said latch in latching position and a second position wherein it releases said latch and switch element to permit the latter to be biased to circuit breaking position, said reset member biasing means becoming effective to bias said reset member to off position upon movement of said thermostatic means to its second position.

2. A thermostatic circuit breaker as set forth in claim 1, further including an auxiliary latch for selectively latching said reset member in on position independently of said switch-actuating latch.

3. A thermostatic circuit breaker comprising a reset member mounted for movement between an off and an on position, means biasing said reset member to off position, a switch mounted on one side of said reset member and including a circuit making and breaking element mounted for movement generally transverse to movement of said reset member, means biasing said switch element toward the reset member to circuit breaking position, a latch carried by said reset member for transverse movement relative thereto in the general direction of movement of said switch element, one end of said latch being in engagement with said switch element and cooperable with a detent on said switch element in the on position of said reset member to latch it in on position, a thermostatic member mounted on the other side of reset member in engagement with the other end of said latch, said thermostatic member being movable in response to temperature change in the general direction of said latch between a first position wherein it holds said latch in position to maintain said switch element in circuit making position against its bias and to latch the reset member in on position against its bias, and a second position wherein the switch element is released to be biased to circuit breaking position and the reset member biasing means is effective to bias the reset member to off position.

4. A thermostatic circuit breaker as set forth in claim 3, further including an auxiliary latch for selectively latching the reset member in on position independently of the thermostatically-controlled latch.

5. A thermostatic circuit breaker as set forth in claim 3, wherein said switch element has an inclined surface engageable by said one end of the latch for camming said switch element toward circuit making position upon movement of said reset member from off to on position provided said thermostatic member is in its first position.

JOHN D. BOLESKY.

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