United States Patent [19]

Summe et al.

[11] **3,737,825**

[45] **June 5, 1973**

[54] OVERLOAD CIRCUIT BREAKER

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[22] Filed: **July 13, 1972**

[21] Appl. No.: **271,603**

[52] **U.S. Cl.** **337/91**, 337/345, 337/348

[51] **Int. Cl.**.....**H01h 61/00**

[58] **Field of Search**.....337/345, 343, 348, 337/76, 88, 95, 370, 85, 91

[56] **References Cited**

UNITED STATES PATENTS

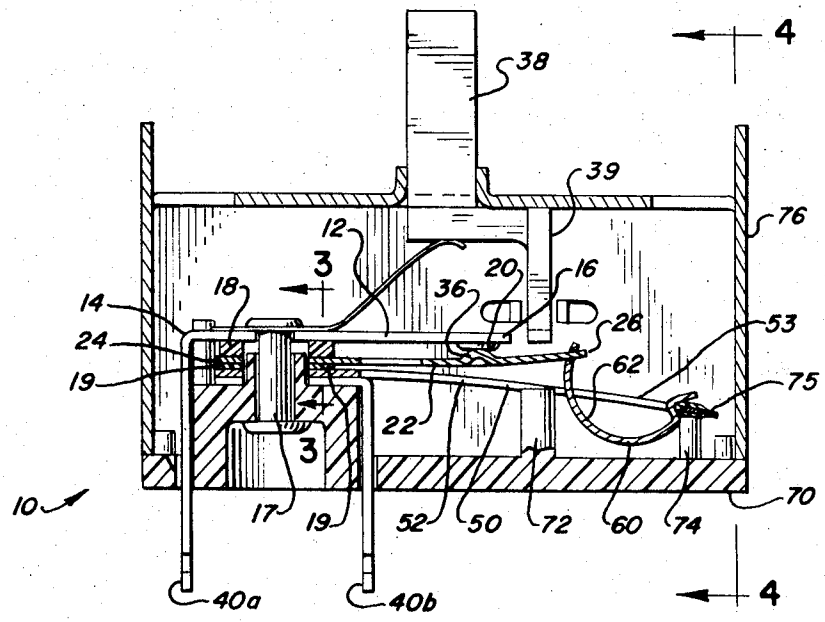
2,558,219	6/1951	Kohl	337/343
2,910,561	10/1959	Frey et al.	337/88

Primary Examiner—Harold Broome
Attorney—Jack C. Berenzweig

[57] **ABSTRACT**

An overload circuit breaker utilizes a stationary member having a first contact element located on its surface and a movable resilient member having a sacrificial contact element located on its surface. A resilient bimetallic member is operable as a toggle to control the movable member. An electrical terminals means is connected such that an electrical circuit is formed through the first and second contact elements as well as through the resilient bimetallic member and the movable resilient member. The resilient bimetallic member and movable resilient member move with a snap-action from the first stable position to the second stable position upon a flow of a predetermined electrical current through the electrical circuit, thereby opening the first contact element and the sacrificial contact element and breaking the electrical circuit. A reset element actuable from a first position to a second position is provided to move the first resilient bimetallic member from the second stable position and back to the first stable position. The reset element is adapted such that the first contact element and the sacrificial contact element do not close until the reset element returns to its first position. In some embodiments, an ambient temperature compensating element is also provided for the overload circuit breaker.

11 Claims, 13 Drawing Figures



3 Sheets-Sheet 1

FIG. 1

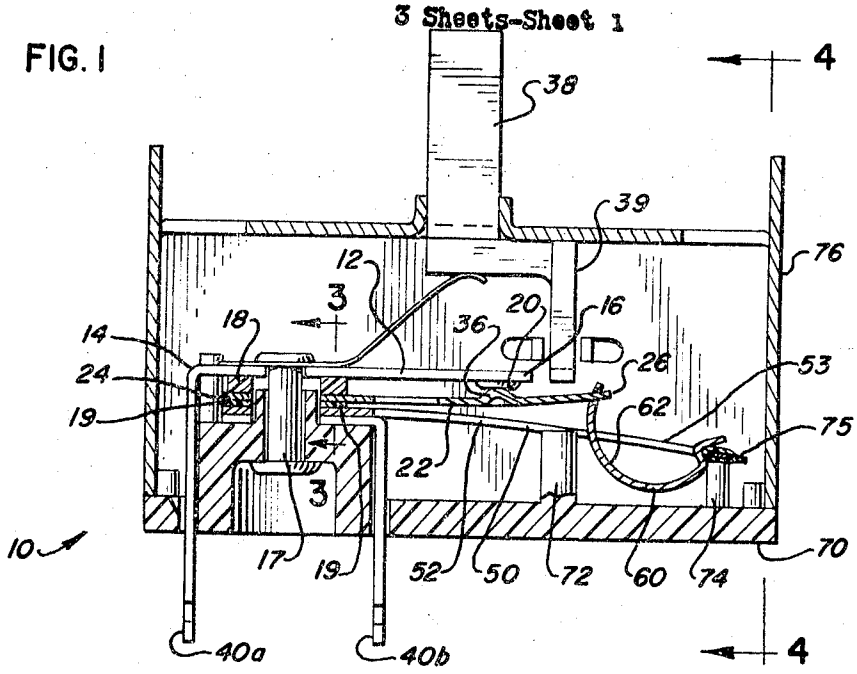


FIG. 2

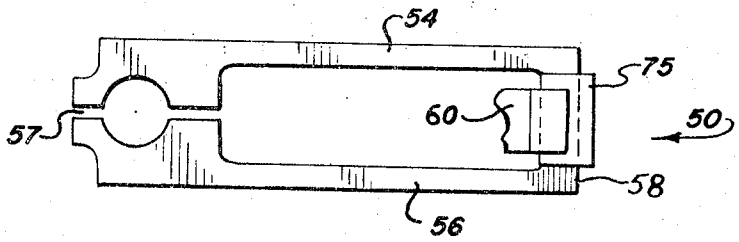


FIG. 3

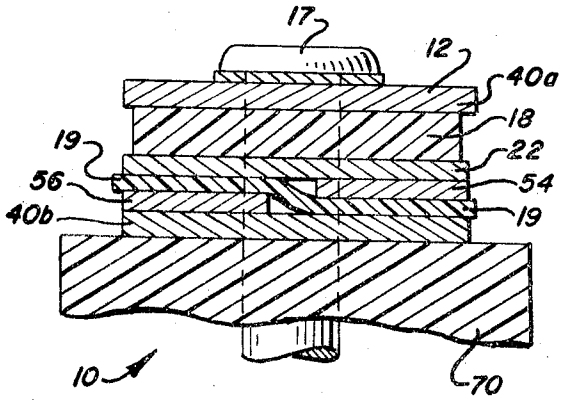


FIG. 4

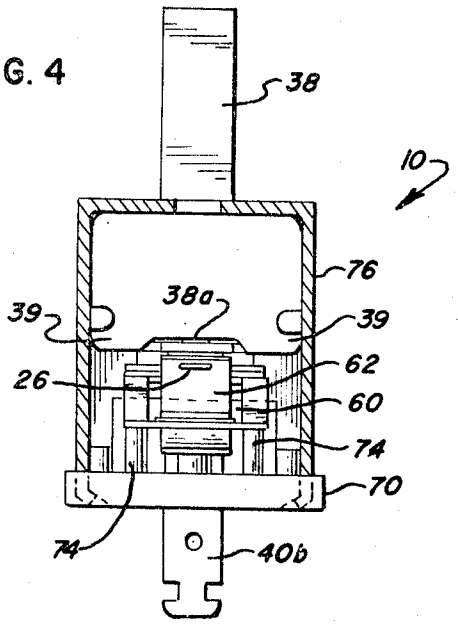
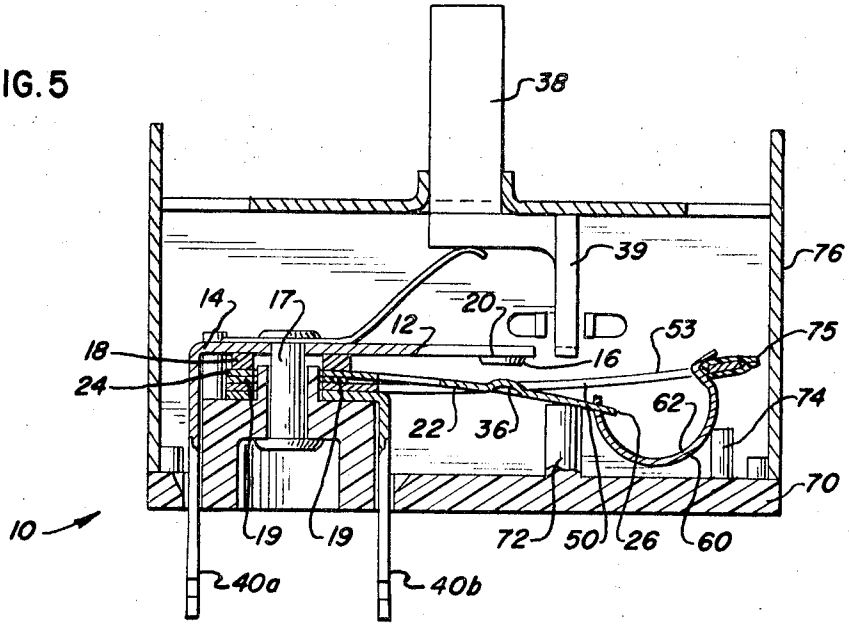


FIG. 5



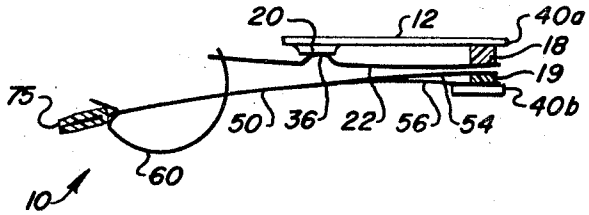


FIG. 6

FIG. 7

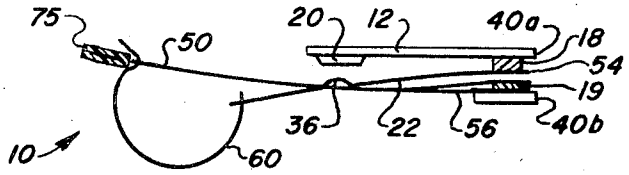


FIG. 8

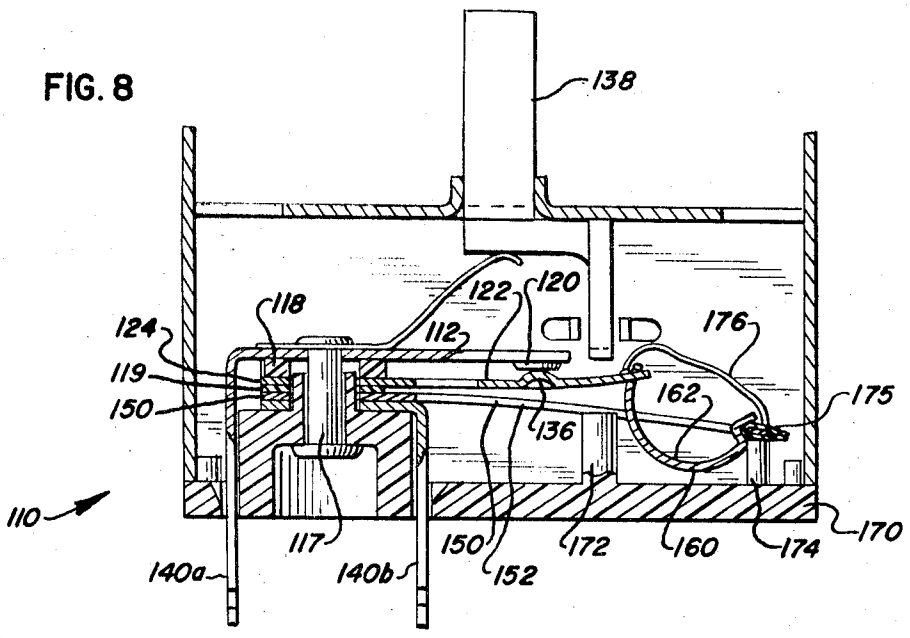


FIG. 9

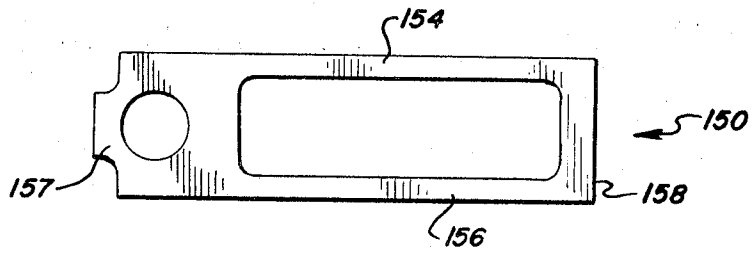


FIG. 10

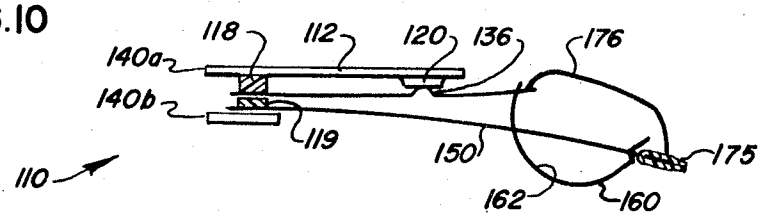


FIG. 11

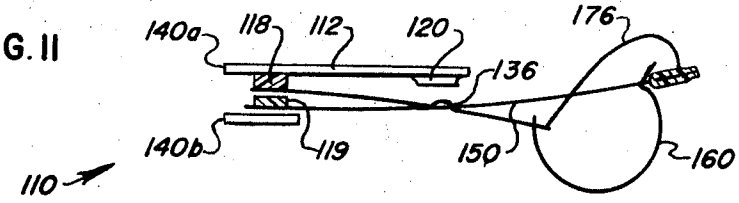


FIG. 12

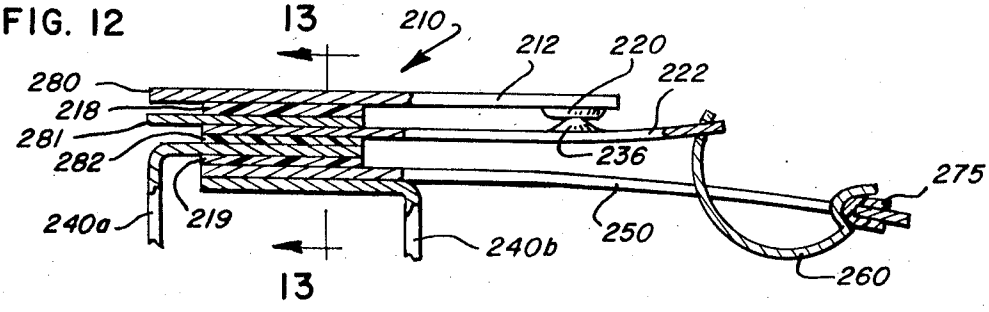
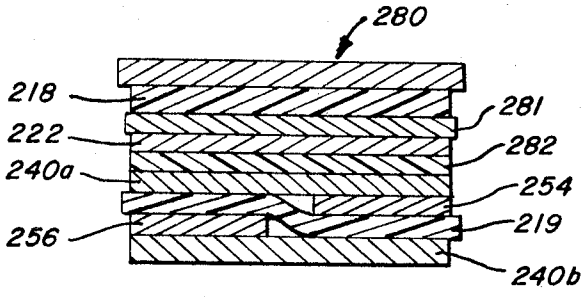


FIG. 13



OVERLOAD CIRCUIT BREAKER

BACKGROUND OF THE INVENTION

The present invention relates to circuit breakers and more particularly, to electrical circuit breakers which are adapted to protect electronic appliances and the like.

In the field of electronics, it has been the general practice to employ either fuses or circuit breakers to perform the protective operation of protecting the apparatus or electronic circuit from an overload current condition. Although many of these devices perform satisfactorily, the delicacy of modern electronic circuitry, such as that found in television receivers and the like, requires a more accurate and dependable overload protective system.

Due to the high degree of heat generated in certain electrical appliances, difficulties have been encountered in the use of conventional circuit breakers where there is a failure to have incorporated therein a means for accurate ambient temperature compensation. While most electronic devices operate at room temperatures of 65°–85° F., the ambient temperature of the environment can go as high as 150° F. Under these elevated ambient temperatures, unless the circuit breaker is properly compensated, the trip point of the breaker may be substantially shifted so that a false tripping or opening of the breaker contacts may occur. The present invention overcomes this difficulty.

It has also been found advantageous to utilize a resetable circuit breaker, especially when used in television receivers. The resetable circuit breaker such as that provided by the instant invention provides that the circuit may only be closed after the operator has removed his hand from the reset mechanism. This is exceptionally important to provide operator protection and circuitry protection within the television receiver.

Heretofore, several prior art circuit breakers have been devised to overcome these problems. However, these prior art circuit breakers have not proved satisfactory under all conditions of service. One such prior art circuit breaker is described in U.S. Pat. No. 2,910,561, issued to C. F. Frey et al. on Oct. 27, 1959. The circuit breaker described in the Frey patent has not proved entirely satisfactory since under conditions of high current, such as 50 amps, the bimetal element **24** would anneal due to its relatively small dimensions. In addition, under conditions of approximately 150 amps the elements of the circuit breaker would split apart and float within the housing thereby creating the danger of uncontrolled short circuits. Furthermore, any accidental impact on the reset button **40** would tend to distort the housing as well as the member **14** thereby inadvertently changing the break point for the circuit breaker. An additional limitation in the Frey circuit breaker arises from the fact that as current through the circuit breaker increases, the pressure between the contacts decreases thereby giving rise to the possibility of an unacceptable performance of the circuit breaker just prior to the break point.

Two similar prior art circuit breakers are disclosed in U.S. Pat. Nos. 3,038,047 and 3,234,348, issued to J. F. Marquis and F. B. Desio, respectively, on June 5, 1962 and Feb. 8, 1966. Each of these circuit breakers utilize a pair of latching contacts. These contacts are not advantageous since they are subject to pitting. It has been recognized that when the contacts become pitted, the break point for the circuit breaker changes. Furthermore, the pitting of the contacts prevents using a low ratio of break current to hold current. Lastly, under high current conditions, the switch member **41** of the Desio patent and the switch member **20** of the Marquis patent would tend to obtain a reverse bend and if the breaker were to fail, this reverse bend would tend to cause the circuit breaker to fail in a closed position rather than in an opened position.

A third type of prior art switch is disclosed in U.S. Pat. No. 2,558,219, issued to E. F. Kohl on June 26, 1951. In this switch, no current is passed through the toggle member **1** or through the C-spring **7.** This switch is designed to momentarily make and break a switch contact. While this switch bears certain similarities to the invention disclosed below, its method of operation is entirely different.

SUMMARY OF THE INVENTION

The general purpose of this invention is to provide an electrical circuit breaker which embraces all of the advantages of similarly employed circuit breakers and possesses none of the aforedescribed limitations. To attain this, the present invention contemplates several unique overload circuit breakers. Each of these circuit breakers employes a bimetallic toggle member which ensures that the pressure between the contacts increases prior to the break point of the circuit breaker thereby ensuring greater reliability. In addition, each of the toggle members is designed so as to eliminate the possibility of being annealed under high current conditions. Furthermore, a sacrificial contact element is employed to overcome the possibility of the contact elements fusing or welding together. Lastly, some of the preferred embodiments of the invention provide for ambient temperature compensation.

It is, therefore, an object of the present invention to provide a circuit breaker wherein the contact pressure is increased prior to opening, which is accurately compensated for ambient temperature changes and which is not subjected to contact sticking or welding.

Another object is to provide a resetable overload circuit breaker wherein the circuit cannot be made while the reset spring or button is depressed.

A further object of the invention is to provide a circuit breaker which may be utilized as a controlled relay.

Still another object of the invention is to provide an overload circuit breaker which is simple in construction, and reliable in operation.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional view of a first preferred embodiment of the invention showing the contacts in their normally closed position.

FIG. **2** is a top plan view of the toggle member used in the circuit breaker of FIG. **1.**

FIG. **3** is a sectional view taken along the line 3—3 of FIG. **1.**

FIG. **4** is a sectional view taken along the line 4—4 of FIG. **1.**

FIG. 5 is a sectional view of the circuit breaker of FIG. 1 showing the contacts in their open position.

FIGS. 6 and 7 are diagrammatic views, with parts removed, of the circuit breaker of FIG. 1, showing the contacts in their closed position and open position, respectively.

FIG. 8 is a sectional view of a second preferred embodiment of the invention showing the contacts in their normally closed position.

FIG. 9 is a top plan view of the toggle member used in the circuit breaker of FIG. 8.

FIGS. 10 and 11 are diagrammatic views, with parts removed, of the circuit breaker of FIG. 8, showing the contacts in their closed and open position, respectively.

FIG. 12 is a diagrammatic view of one of the circuit breakers of the present invention being utilized as a controlled relay.

FIG. 13 is a sectional view taken along the lines 13—13 of FIG. 12.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIGS. 1–4 an overload circuit breaker **10** which illustrates a first embodiment of the invention. The overload circuit breaker **10** includes a stationary member **12** which has a first end **14** and a second end **16.** In the preferred embodiment, the stationary member **12** is substantially planar and is manufactured from any suitable conducting material. The first end **14** of the stationary member **12** is connected to an insulator **18** in a conventional manner. As will become evident below, the insulator **18** may comprise a single insulator having slots therein to accept the various members or may comprise a plurality of insulators which are fastened together by a suitable fastening means **17.** Located on the surface of the stationary member **12** is contact element **20.** The contact element **20,** in the preferred embodiment, may comprise any suitable conducting material and may be integral with the stationary member **12** or may be affixed thereto in conventional manner.

The overload circuit breaker **10** further comprises a resilient member **22** having a first end **24** and a second end **26.** The first end **24** of the resilient member **22** is secured within the insulator **18** and is spaced apart from the stationary member **12.** A sacrificial contact element **36** is located on the upper surface of the resilient member **22.** In the preferred embodiment, the contact element **36** is embossed on the surface of the resilient member **22.**

Resilient member **22** is manufactured from a metal having conventional current carrying capability for normal currents. However, the melting point and thermal conductivity of the metal and the shape of the emboss (element **36**) are such that under large current surges, the high current density will cause element **36** to become molten in the area where it contacts element **20.** Because the contact element **36** becomes molten at high current levels, the contact element **36** will not become welded nor will it fuse to the other contact element **20.** This type of contact is known as a sacrificial contact.

The overload circuit breaker **10** further comprises a resilient bimetallic toggle member **50.** As can be seen from FIG. **2,** the resilient bimetallic toggle member **50** comprises a first leg **54** and a second leg **56.** The first and second legs **54** and **56** are electrically connected at the second end **58** of the resilient bimetallic toggle member **50.** However, the first leg **54** and the second leg **56** are not electrically connected at the first end **57** of the bimetallic toggle member **50.** The bottom surface **52** of the bimetallic resilient toggle member **50** comprises a high expansion side while the top surface **53** comprises a low expansion side. The resilient bimetallic toggle member **50** in the preferred embodiment comprises a relatively large cross-sectional and surface area. These large areas serve to dissipate heat which is caused by large current surges and also serve as a thermal reservoir thereby preventing circuit breaker **10** from being subject to false openings which might be caused by short duration transients which are not harmful to the circuit being protected.

As can be seen from FIGS. **1** and **3,** the first leg **54** is placed in contact with the first end of the resilient member **22.** The first end of the second leg **56** of the resilient bimetallic toggle member **50** is insulated from the resilient member **22** by an insulator **19.** An electrical terminal means **40***a* which is part of stationary member **12** and an electrical terminal means **40***b* which is connected to the second leg **56** of the resilient bimetallic toggle member **50** are provided. An electrical circuit is, therefore, formed through the terminal means **40***b,* through the second leg **56** of the bimetallic toggle member **50,** through the first leg **54** of the bimetallic toggle member **50,** through the resilient member **22,** the contact elements **36, 20,** and finally out through the stationary member **12** and the terminal means **40***a.*

Referring again to FIG. **1,** a resilient C-spring **60** is mounted between the second end **26** of the resilient member **22** and the end **58** of the resilient bimetallic toggle member **50.** The C-spring **60** is provided to maintain the resilient bimetallic toggle member **50** in a first stable position and to maintain the resilient member **22** in a first stable position as shown in FIG. **1.** When the resilient bimetallic toggle member **50** and the resilient member **22** are in their first stable positions, the contact elements **20** and **36** are closed. The C-spring **60** may be made from any resilient material and it will be recognized that its shape may be changed and need not necessarily comprise a C shape. The C-spring **60** is electrically insulated from the bimetallic toggle member **50** by an insulating member **75** placed on the end **58.** If ambient temperature compensation is desired in the circuit breaker **10,** the C-spring **60** may be made from a bimetallic material and the high expanding side of the bimetallic material would be placed on the inner surface **62** of the C-spring **60.** It should be noted that as the ambient temperature increases, the C-spring **60** will expand thereby counteracting the expansion of the bimetallic element **50** due to the increasing ambient temperature thereby eliminating the possibility of an inadvertant opening of the contact elements **20** and **36.**

When the contact elements **20** and **36** are in their closed position, as shown in FIGS. **1** and **6,** the bimetallic toggle member **50** is in its first stable position. If an overload current condition occurs, the bimetallic toggle member **50** would bend and move upward over center to a second stable position and the resilient member **22** would move downward with a snap action to a second stable position thereby compressing the C-spring **60** and causing the contact elements **20** and **36** to sepa-

rate when the toggle member **50** goes over center as shown in FIGS. **5** and **7**.

The bimetallic toggle member **50** reacts in this manner since during an overload condition, excessive heat is generated and this causes the high expansion side of the resilient bimetallic toggle member **50** to expand at a greater rate than the low expansion side of the resilient bimetallic toggle member **50**, thereby causing the resilient bimetallic toggle member **50** to bend from its first stable condition to its second stable condition. It will be readily noted that as the high expansion side of the resilient bimetallic toggle member **50** expands, the pressure exerted between the contact elements **20** and **36** increases until the resilient bimetallic toggle member **50** and the resilient member **22** snap into their second stable positions thereby opening the contacts. The predetermined current level at which this snap action occurs is commonly referred to as the break point or set point for the circuit breaker.

The contact elements **20** and **36** remain separated until the resilient bimetallic toggle member **50** is returned to its first stable position. A reset element **38** is provided for this purpose. The reset element shown in FIG. **1** is adapted to move from a first position, as shown in FIG. **1**, to a second position. When it is desired to reset the overload circuit breaker **10**, the reset element **38** is depressed downwardly to a second position. A pair of shoulders **39** (FIG. **4**) on the reset element **38** contacts the legs **54** and **56** of the resilient bimetallic toggle member **50** causing the resilient bimetallic toggle member **50** to snap back to its first stable position thereby compressing the C-spring **60** and moving the second end **26** of the resilient member **22** upwardly thereby closing the contact elements **20** and **36**. It will be noted that so long as the reset element **38** is depressed, the bridge **38***a* between the shoulders **39** will prevent the movable member **22** from snapping back to its first stable position and this will prevent the contact elements **20** and **36** from closing. When the reset element **38** is released, thereby enabling the reset element **38** to go back to its first position, the contact elements **20** and **36** will then close. By requiring the reset element **38** to return to its first position, prior to the closing of the contact elements **20** and **36**, this assures that the operator will not reclose the circuit until his hand has been removed thereby adding to the safety of the overload circuit breaker **10**.

As can be seen in FIGS. **1–5**, the circuit breaker **10** further comprises a base member **70** upon which the resilient elements described above are mounted. The base member **70** comprises a conventional insulator material through which the terminal means **40***a* and **40***b* extend. An extension **72** is provided to serve as a stop for button **38** so that the resilient members are not damaged when button **38** is subjected to impact. Extension **72** also limits the downward travel of resilient member **22** when the contacts are open. Extension **72** further serves to hold resilient member **22** in a fixed position so that shoulders **39** on button **38** will push legs **54** and **56** of resilient bimetallic toggle member **50** over center with respect to the position of resilient member **22** and allow circuit breaker **10** to be reset. A pair of extensions **74** are provided to limit the downward travel of toggle member **50** and thereby assure that the contacts **36** and **20** remain closed when circuit breaker **10** is exposed to cold ambient temperatures.

Lastly, a housing **76** is placed over the base member **70** to protect the entire circuit breaker **10**. It will be recognized that the overload circuit breaker **10**, as well as the alternative circuit breaker described below, may be placed within any other suitably shaped housing and, furthermore, may also be utilized without a housing if it is so desired.

Referring now to FIGS. **8–11**, an overload circuit breaker **110** is shown which is similar to the overload circuit breaker **10**. In this embodiment, a resilient bimetallic toggle member **150** (FIG. **9**) comprises a bimetallic construction having the high expanding side on the lower surface **152**. A resilient member **122** is provided and is insulated from the toggle member **150** by an insulator **119**. The resilient member **122** comprises a conductive material but is not bimetallic. A stationary member **112** is also provided. As before, a pair of contact elements **120** and **136** are provided on the lower surface of the stationary member **112** and the upper surface of the resilient element **122**, respectively. A C-spring **160** is provided which maintains the contact elements **120** and **136** in their closed position. A pair of electrical terminals **140***a* and **140***b* are connected respectively to the stationary member **112** and the resilient bimetallic toggle member **150**. When the electrical terminals **140***a* and **140***b* are connected to a source of current, an electrical circuit is provided through the resilient bimetallic toggle member **150**, the conductive C-spring **160**, the resilient member **122**, the contact elements **136** and **120**, and the stationary member **112**. As shown in FIGS. **10** and **11**, when the resilient bimetallic toggle member **150** is in its first stable condition, the contact elements **120** and **136** are closed. An overload of current flowing through the overload circuit breaker **110** would cause the resilient bimetallic toggle member **150** to move upward, thereby compressing the C-spring **160**. When the C-spring **160** was compressed enough, the resilient bimetallic toggle member **150** would move over its center position and shift into a second stable position. The C-spring **160** would then push down the resilient member **122** thereby opening the contact elements **120** and **136**. A reset element **138** is also provided to reset the contacts in a manner similar to that described above in connection with circuit breaker **10**. As mentioned previously, the C-spring **160** may be made from any resilient material and it will be recognized that its shape may be changed and need not necessarily comprise a C shape.

If it is desired to compensate the overload circuit breaker **110** for changes in ambient temperature, the C-spring **160** may utilize a bimetallic construction having the high expansion side along the upper surface **162**. However, it will then be necessary to insulate the C-spring **160** by insulating members **175**, from the bimetallic toggle member **150** and provide a flexible conductor **176** as a current bypass path. In this instance, a current path is provided from the terminals **140***a* and **140***b* through the resilient bimetallic toggle member **150**, the flexible conductor **176**, the resilient element **122**, the contact elements **136** and **120**, and the stationary member **112**. The operation of the temperature compensation portion of the overload circuit breaker **110** will then be identical with that described above in connection with circuit breaker **10**.

It is evident from the above construction that the operation of the circuit breaker **110** embodies the same advantage of the circuit breaker **10**; e.g., constantly in-

creasing contact pressure prior to the break point, sacrificial contact element **136** to prevent welding, and relatively large cross-sectional and surface areas on toggle member **50** to prevent annealling by dissipating large amounts of heat which is caused by large current surges and also serve as a thermal reservoir preventing false openings due to short duration transients.

Referring now to FIG. **12**, there is shown a relay control **210**. It will be recognized that the relay control **210** is very similar to the overload circuit breaker **10** disclosed in FIGS. **1–7**. The relay control **210** comprises a stationary member **212** and a movable resilient member **222** which are connected via electrical terminals **280** and **281** to any electrical circuit. Located on the surface of the stationary member **212** is a contact element **220** and similarly, a contact element **236** is located in the movable member **222**. A toggle member **250** and a C-spring **260** are provided and serve the same function as their equivalent members shown in FIGS. **1–7**.

Insulator **282** has been added between movable member **222** and first leg **254** of bimetallic toggle member **250**. Electrical terminal **240***a* is placed in contact with the first leg **254**. The second leg **256** of bimetallic toggle member **250** is insulated from electrical terminal **240***a* by insulator **219**. Electrical terminal **240***b* is connected to second leg **256**. The electrical circuit formed through terminal **240***b*, through the second leg **256** of bimetallic toggle member **250**, through the first leg **254** of bimetallic toggle member **250**, and finally out through terminal **240***a* becomes the control circuit. If it is desired to open the contact elements **220** and **236**, it is only necessary to place a predetermined current through the control circuit which will then cause the resilient bimetallic toggle element **250** to move from its first stable position to its second stable position thereby opening the contacts **220** and **236**.

It will be recognized by one skilled in the art that many other overload control circuits may be modified to act as a relay in the same manner.

Obviously, many modifications and variations of the present invention are possible in light of the above teaching and it should be understood that the foregoing disclosure relates only to preferred embodiments of the invention and that numerous modifications or alterations may be made therein without departing from the spirit and the scope of the invention as set forth in the appended claims.

What is claimed is:

1. An overload circuit breaker comprising:

an insulating means;

a first snap action resilient bimetallic member operable between a first stable position and a second stable position wherein said resilient bimetallic member comprises a first leg and a second leg spaced apart from said first leg wherein said first leg and said second leg are electrically insulated from each other at a first end and are electrically connected at a second end and wherein said first end is secured to said insulating means;

a first resilient conducting member comprising a first end and a second end wherein said first end is electrically connected to said first leg of said first bimetallic member;

a stationary conducting planar member comprising a first end and a second end wherein said first end is secured to said insulating means and is spaced apart from said first resilient conducting member;

a first contact element located on the surface of said stationary conducting member;

a second contact element located on the surface of said resilient conducting member;

a second resilient member connected between said second end of said first bimetallic member and said second end of said first resilient conducting member and electrically insulated therefrom wherein said second resilient member maintains said first resilient bimetallic member in said first stable position whereby said first and second contact elements are electrically closed against each other;

electrical terminal means connected to said second leg of said first bimetallic resilient member and connected to said stationary conducting member whereby when said first and second contact elements are closed against each other an electrical circuit is provided through said first resilient bimetallic conducting member, said first resilient conducting member, said first and second contact elements, and said stationary conducting member and whereby said first resilient bimetallic member moves with a snap action to said second stable position upon a flow of a predetermined electrical current through said electrical circuit thereby opening said first and second contact elements and breaking said electrical circuit; and

reset means actuable from a first position to a second position to move said resilient bimetallic member from said second stable position to said first stable position wherein said reset means prevents said first and second contact elements from closing until said reset means returns to said first position.

2. The overload circuit breaker of claim **1** wherein said second resilient member comprises a bimetallic conducting member and acts as an ambient temperature compensating means.

3. The overload circuit breaker means of claim **2** wherein said second resilient member comprises a C-spring and wherein said C-spring is compressed when said first bimetallic member goes from said first stable position to said second stable position.

4. The overload circuit of claim **3** wherein said reset means comprises:

a reset means which is actuable from said first position to said second position whereby said reset means in said second position causes said first bimetallic member to move from said second stable position to said first stable position thereby compressing said second resilient member and wherein said reset means prevents said first and second contact elements from closing until said reset means returns to said first position.

5. The circuit breaker of claim **4** further comprising a base means operably associated with said first bimetallic member and a limit means located on said base means to prevent excessive downward travel of said first resilient conducting member when said reset means is actuated from said first position to said second position and said limit means also providing reset button restraint to eliminate impact damage.

6. The circuit breaker of claim **1** wherein said second contact element comprises a sacrificial contact.

7. An overload circuit breaker comprising:

an insulating means;

a first snap action resilient bimetallic toggle member operable between a first stable position and a second stable position wherein said resilient bimetallic member is planar and comprises a first end and a second end and wherein said first end is secured to said insulating means;

a stationary conducting member comprising a first end and a second end wherein said first end is secured to said insulating means and is spaced apart from said first resilient bimetallic member;

a first resilient conducting planar member comprising a first end and a second end wherein said first end is secured to said insulating means and is spaced apart from said stationary conducting member;

a first contact element located on the surface of said stationary conducting member;

a second contact element located on the surface of said first resilient conducting member;

a second resilient conducting member connected between said second end of said first bimetallic toggle member and said second end of said first resilient conducting member wherein said second resilient conducting member maintains said first resilient bimetallic member in said first stable position whereby said first and said second contact elements are electrically closed against each other;

electrical terminal means connected to said first bimetallic resilient member and connected to said stationary conducting member whereby when said first and second contact elements are closed against each other, an electrical circuit is provided through said first resilient bimetallic member, said second resilient member, second end of first resilient member, said first and second contact elements, and said stationary conducting member and whereby said first resilient bimetallic member moves with a snap action to said second stable position upon a flow of a predetermined electrical current through said electrical circuit thereby opening said first and second contact elements and breaking said electrical circuit; and

reset means actuable from a first position to a second position to move said first resilient bimetallic member from said second stable position to said first stable position wherein said reset means prevents said first and second contact elements from closing until said reset means returns to said first position.

8. The overload circuit means of claim 7 wherein said second resilient member comprises a C-spring and wherein said C-spring is compressed when said first bimetallic member goes from said first stable position to said second stable position.

9. The overload circuit of claim 8 wherein said reset means comprises:

a reset means which is actuable from said first position to said second position whereby said reset means in said second position causes said first bimetallic member to move from said second stable position to said first stable position thereby compressing said second resilient member and wherein said reset means prevents said first and second contact elements from closing until said reset means returns to said first position.

10. An overload circuit breaker comprising:

an insulating means;

a first snap action resilient bimetallic toggle member operable between a first stable position and a second stable position wherein said resilient bimetallic member is planar and comprises a first end and a second end and wherein said first end is secured to said insulating means;

a stationary conducting member comprising a first end and a second end wherein said first end is secured to said insulating means and is spaced apart from said first resilient bimetallic member;

a resilient conducting planar member comprising a first end and a second end wherein said first end is secured to said insulating means and is spaced apart from said stationary conducting member;

a first contact element located on the surface of said stationary conducting member;

a second contact element located on the surface of said resilient conducting member;

a second resilient bimetallic conducting member connected between said second end of said first bimetallic toggle member and said second end of said resilient conducting member and electrically insulated therefrom wherein said second resilient bimetallic conducting member acts as an ambient temperature compensating means and maintains said first resilient bimetallic member in said first stable position whereby said first and said second contact elements are electrically closed against each other;

flexible conductor means for electrically connecting said first resilient bimetallic member to said resilient conducting planar member;

electrical terminal means connected to said first bimetallic resilient member and connected to said stationary conducting member whereby when said first and second contact elements are closed against each other an electrical circuit is provided through said first resilient bimetallic member, said flexible conductor means, second end of first resilient member, said first and second contact elements, and said stationary conducting member and whereby said first resilient bimetallic member moves with a snap action to said second stable position upon a flow of a predetermined electrical current through said electrical circuit thereby opening said first and second contact elements and breaking said electrical circuit; and

reset means actuable from a first position to a second position to move said resilient bimetallic member from said second stable position to said first stable position wherein said reset means prevents said first and second contact elements from closing until said reset means returns to said first position.

11. A relay control for an electrical circuit comprising:

a first, second and third insulating means;

a first snap action resilient bimetallic member operable between a first stable position and a second stable position wherein said resilient bimetallic member comprises a first leg and a second leg spaced apart from said first leg wherein said first leg and said second leg are electrically insulated from each other at a first end and are electrically connected at a second end;

a first resilient conducting member comprising a first end and a second end wherein said first end is electrically insulated from said first bimetallic member by said first insulating means;

a stationary conducting member comprising a first end and a second end wherein said first end is secured to said second insulating means and is spaced apart from said first resilient conducting member;

a first contact element located on the surface of said stationary conducting member;

a second contact element located on the surface of said resilient conducting member wherein said first and second contact elements are electrically connected to said electrical circuit;

a second resilient member connected between said second end of said first bimetallic member and said second end of said first resilient conducting member and electrically insulated therefrom wherein said second resilient member maintains said first resilient bimetallic member in said first stable position whereby said first and second contact elements are electrically closed against each other;

first electrical terminal means connected to said first leg of said first bimetallic resilient member and insulated from said stationary conducting member by said first insulating means;

second electrical terminal means connected to said second leg of said first bimetallic resilient member and insulated from said first leg by said third insulating means;

a source of control current connected to said first and second electrical terminal means wherein said control current causes heat in said first resilient bimetallic member and wherein said heat causes said first resilient bimetallic member to move to said second stable position thereby opening said first and second contact elements and breaking said electrical circuit; and

reset means actuable from a first position to a second position to move said first resilient bimetallic member from said second stable position to said first stable position wherein said reset means prevents said first and second contact elements from closing until said reset means returns to said first position.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,737,825 Dated June 5, 1973

Inventor(s) Richard D. Summe and Everett H. Vannoy

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 8, line 38, delete "conducting".

Column 8, line 45, after "circuit" insert --breaker--.

Column 9, line 50, after "circuit" insert --breaker--.

Column 9, line 55, after "circuit" insert --breaker--.

Column 10, line 19, delete "conducting".

Add the following claims:

--12. The circuit breaker of Claim 7 wherein said second contact element comprises a sacrificial contact.--

--13. The circuit breaker of Claim 10 wherein said second contact element comprises a sacrificial contact.--

--14. The relay control of Claim 11 wherein said second contact element comprises a sacrificial contact.--

Signed and sealed this 18th day of December 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents

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