United States Patent

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[72] Inventor **David E. Clarke**
Bristol, Mass.

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[73] Assignee **Texas Instruments Incorporated**
Dallas, Tex.

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[54] **CIRCUIT BREAKER**
4 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** 200/77; 337/62
[51] **Int. Cl.** **H01h 15/18**
[50] **Field of Search** 200/76, 77, 68; 337/62

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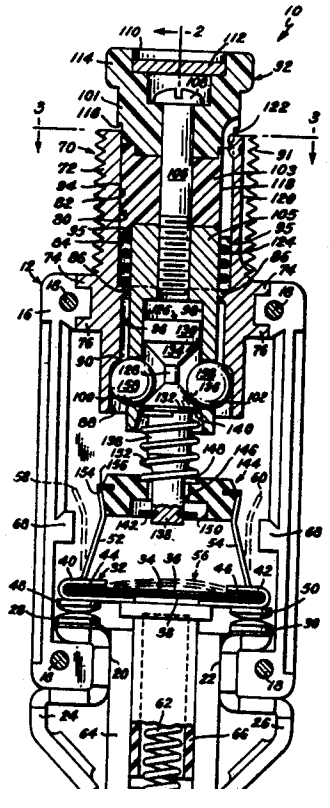
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Primary Examiner—David Smith, Jr.
Attorneys—Harold Levine, Edward J. Connors, Jr., John A. Haug, James P. Mc Andrews and Gerald B. Epstein

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ABSTRACT: A circuit breaker comprises a casing, a pair of contacts mounted on the casing, and a member movable between a position bridging said contacts for closing a circuit and a position opening said circuit. The bridging member is adapted to flex to a selected extent in response to a selected current in the circuit and a pair of upstanding arms on the bridging member are adapted to move apart to a selected extent in response to such flexing of the member. First biasing means mounted in the casing bias the bridging member to its open circuit position. A bushing having a central bore is then mounted on the casing, the bore having first and second diameter portions connected by a shoulder within the bore which faces the bridging member. An operating member is slidable in this bore between open and closed circuit positions thereof, the operating member having a recess at one end facing the bridging member and having at least one peripheral aperture opening into the recess. Second biasing means engage the operating member and the bushing for biasing the operating member to its open circuit position. A first latching member has a cam portion slidable in the operating member recess and has a shank portion extending from the recess. A second latching member is slidably mounted on this shank portion of the first latching member; a latching ball is disposed within the aperture opening into the operating member recess and engages the cam portion of the first latching member therein; and a third biasing means engaging the first and second latching members biases the cam portion of the first latching member away from the second latching member. The second latching member normally engages the arms of the bridging member for holding the bridging member in its closed circuit position and for biasing the cam portion of the first latching member to cam the latching ball through the operating member aperture into engagement with the shoulder in the bushing bore to releasably hold the operating member in its closed circuit position. However, the second latching member is adapted to be released from its engagement with the bridging member arms in response to said movement of the arms, thereby to release the cammed engagement of the latching ball with the shoulder within the bushing bore and to permit the operating member and the bridging member to move their open circuit positions in response to said biasing means. Manual force moving the operating member toward its open circuit position also serves to apply a force to the latching ball engaged by the bushing shoulder for camming the cam portion of the first latching member toward the second latching member against the bias of the third biasing means, thereby to permit the latching ball to disengage the bushing shoulder and to permit the operating member and the bridging member to move to their open circuit positions in response to the first and second biasing means.



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Fig. 1.

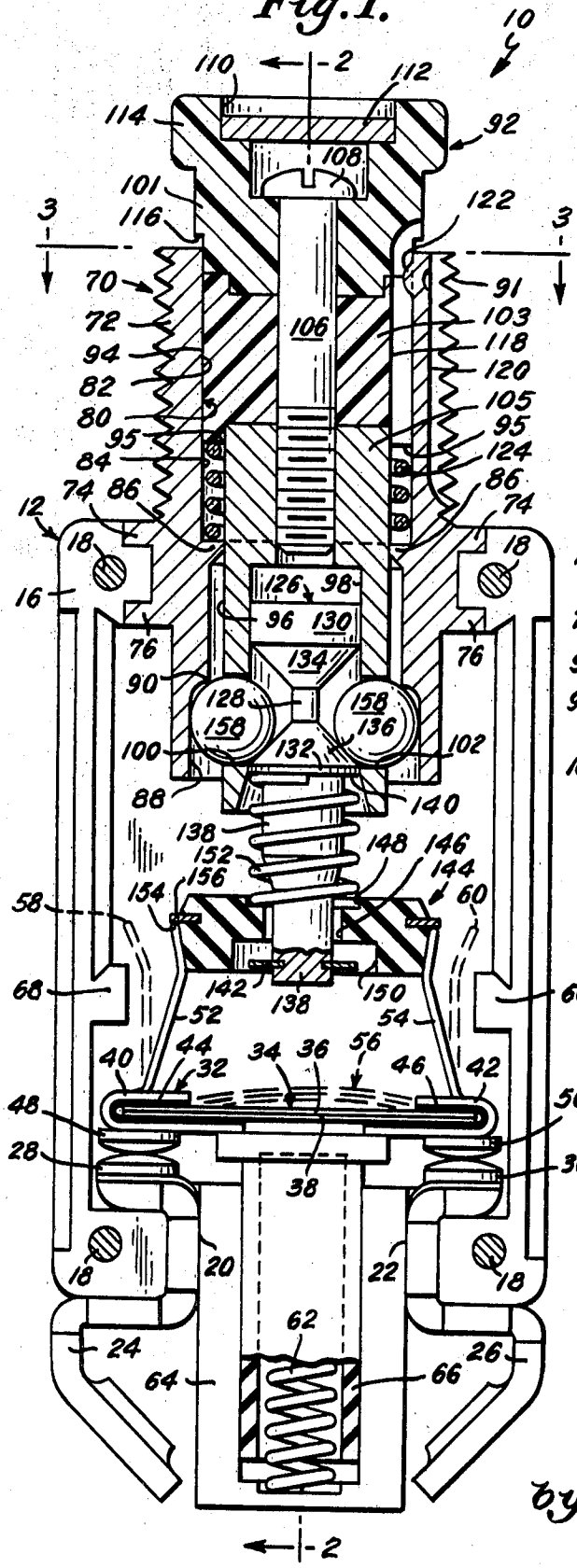
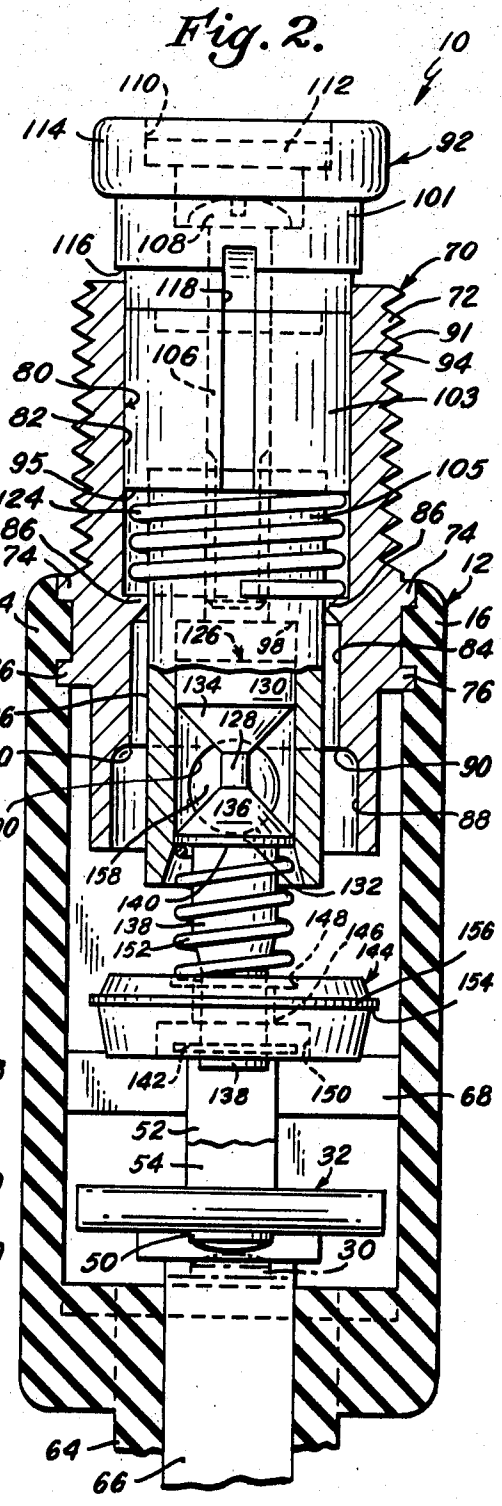
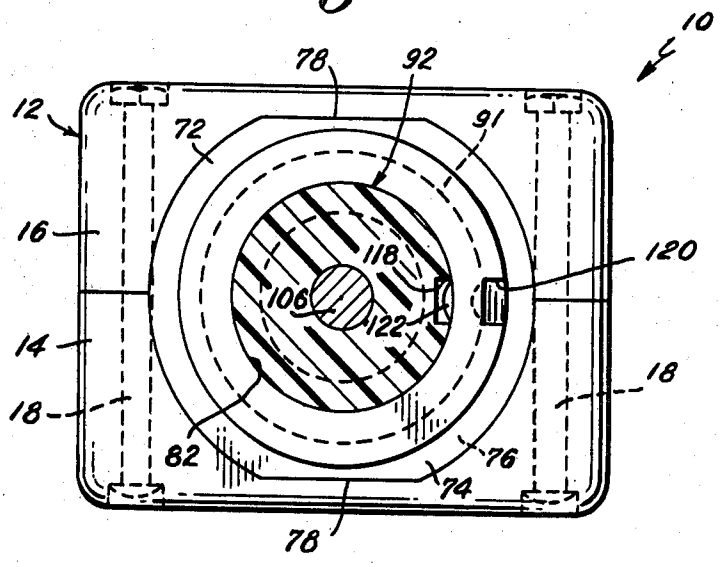


Fig. 2.



Inventor,
David E. Clarke,
by James P. McAndrews
Att'y.

Fig. 3.



Inventor,
David E. Clarke,
by James P. McAndrews
Att'y.

Fig. 4.

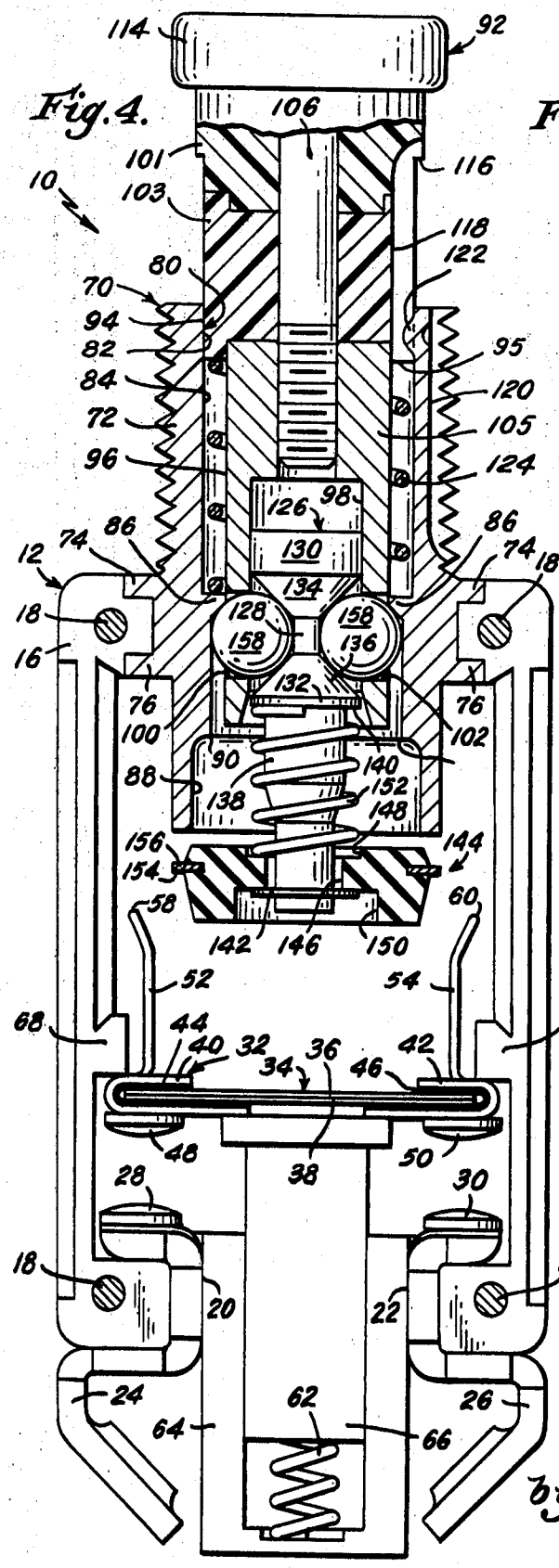
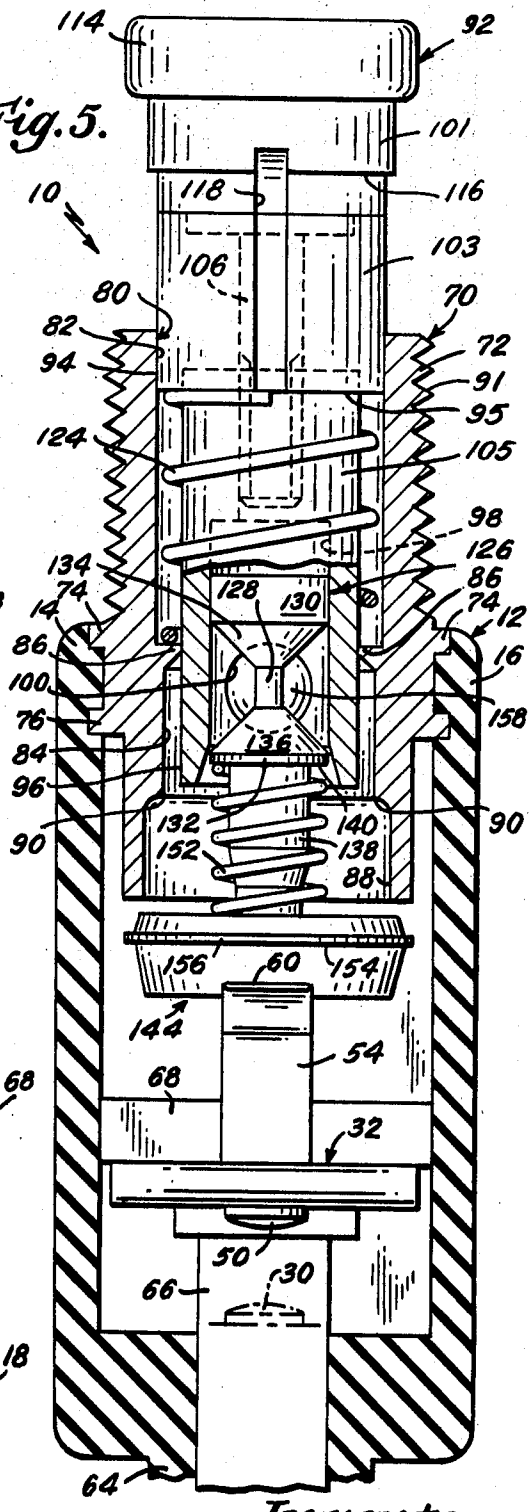


Fig. 5.



Inventor,
David E. Clarke,
by James P. McAndrews,
Att'y.

Fig. 6.

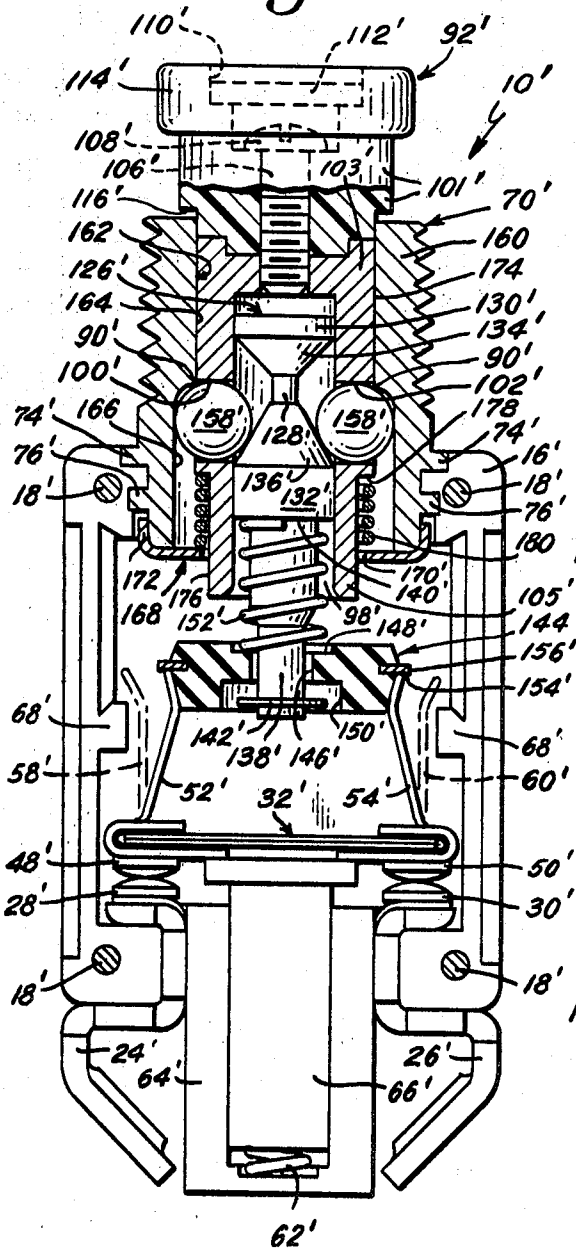
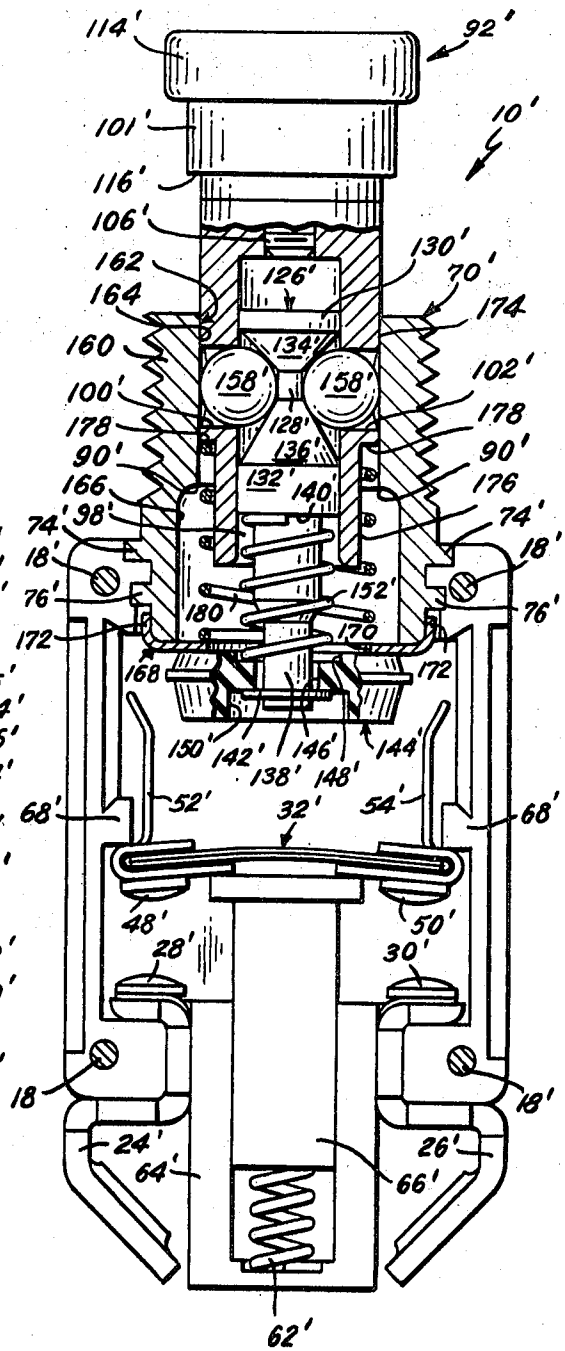


Fig. 7.



Inventor,
David E. Clarke,
by James P. McAndrews
Att'y.

CIRCUIT BREAKER

In a known circuit breaker construction, a thermally responsive contact bridging member is adapted to flex in response to an overload current in the breaker circuit, the member having a pair of upstanding arms the ends of which are adapted to move apart as the member flexes. A latching mechanism engages the bridging member arms for holding the bridging member in a closed circuit position against a bias and is adapted to release its engagement with the bridging member arms as the arms move apart in response to an overload current, thereby to permit the bridging member to move to its open circuit position in response to said bias. The engagement of the latching mechanism with the bridging member arms is also utilized to move the thermally-responsive bridging member between its open and closed circuit positions when operating the circuit breaker as a manually operable switch. This device operation by means of engagement between the latching mechanism and bridging member arms is found to be particularly advantageous in that the device can be repeatedly operated as a manual switch without tending to vary the thermal response characteristics of the bridging member. However, it has been found that the latching mechanism required for use in this device has been unduly complex and expensive and has been bulky and of inadequate reliability.

It is an object of this invention to provide a novel and improved thermally-responsive circuit breaker device; to provide such a device which is also adapted for repeated operation as a manual switch; to provide such a device which is operable as a switch without tending to vary its thermal response characteristics; and to provide such a device which incorporates a particularly inexpensive, compact and reliable latching mechanism.

Other objects, advantages and details of the circuit breaker of this invention appear in the following detailed description of preferred embodiments of the invention, the detailed description referring to the drawings in which:

FIG. **1** is an elevation view, in section, of one embodiment of the circuit breaker of this invention;

FIG. **2** is a section view along line **2–2** of FIG. **1**;

FIG. **3** is a section view along line **3–3** of FIG. **1**;

FIG. **4** is an elevation view similar to FIG. **1** illustrating an alternate position of the circuit breaker shown in FIG. **1**;

FIG. **5** is an elevation view similar to FIG. **2** illustrating an alternate position of the circuit breaker shown in FIG. **1**;

FIG. **6** is an elevation view similar to FIG. **1** illustrating an alternate embodiment of the circuit breaker of this invention; and

FIG. **7** is an elevation view similar to FIG. **4** illustrating an alternate position of the circuit breaker shown in FIG. **6**.

Referring to the drawings, **10** in FIGS. **1—5** indicates a preferred embodiment of the novel and improved circuit breaker of this invention. As shown, the circuit breaker includes a base or casing **12** comprising a pair of interfitting casing members **14** and **16** formed of a suitably rigid, electrically insulating material such as a moldable phenolic resin conventionally used in such casings. The casing members **14** and **16** are secured together by a plurality of threaded fasteners **18** as is best illustrated in FIGS. **1** and **3**.

Each of the casing members **14** and **16** provides complementary shaped recesses **20** and **22** for respectively receiving electrically conductive metal terminals **24** and **26**. The casing member recesses and the terminals **24** and **26** are cooperatively shaped as illustrated so that, when the terminals are positioned between the casing members and when the casing members are secured together with the threaded means **18**, the terminals are fixed securely in place within the circuit breaker **10**. As shown, the terminals **24** and **26** respectively mount electrical contacts **28** and **30** for holding said contacts in fixed position within the circuit breaker **10**.

The circuit breaker **10** further includes a thermally responsive bridging contact member **32** such as is illustrated and described in U.S. Pat. No. 3,210,501 issued in the name of the present inventor to the assignee of the present invention on

Oct. 5, 1965. That is, the bridging contact member **32** embodies a composite bimetallic member **34** formed of a layer of metal **36** of relatively high coefficient of thermal expansion and a layer of metal **38** of relatively low coefficient of thermal expansion, these metal layers being bonded together. The bridging member **32** further embodies a pair of electrically conductive U-shaped metal strips **40** and **42** each of which encloses one edge of the bimetallic member **34**. U-shaped electrically insulating elements **44** and **46** are then disposed between the respective U-shaped metal strips and the bimetallic member **34** as shown in FIG. **1**. A pair of electrical contacts **48** and **50** are then secured in electrically conductive relation to the respective U-shaped strips **40** and **42** by welding or the like. In addition, each of the U-shaped metal strips **40** and **42** is provided with a respective upstanding arm **52** and **54**, which may be formed integral with the respective U-shaped metal strip. In a preferred embodiment of the bridging contact member **32**, the bimetallic member **34**, only an edge of which is illustrated in FIG. **1**, is substantially in sheet form but has a plurality of slots alternately extending into the bimetallic sheet from the left and from the right as the member **34** is viewed in FIG. **1**. These slots give the bimetallic member the form of a continuous strip of bimetallic material made up of a plurality of interconnected elements each extending transversely between the U-shaped metal strips **40** and **42**. One end of this continuous strip is electrically connected to the U-shaped metal strip **40** by welding or the like while the other end of the continuous strip is electrically connected to the U-shaped metal strip **42** in similar manner. The U-shaped insulating strips **44** and **46**, preferably formed of glass fibers embedded in a thermosetting plastic, are then bonded to the respective U-shaped metal strips **40** and **42** and to the bimetallic member **34**, thereby to electrically insulate the transverse elements of the bimetallic member from the U-shaped metal strips except at the ends of the continuous bimetallic strip formed by these transverse elements. In this construction, the electrical contact **48** is electrically connected to the contact **50** through the U-shaped metal strip **40**, through the continuous strip of bimetallic material formed by the bimetallic member **34**, and through the U-shaped metal strip **42**, thereby to form an electrical circuit to bridge the fixed contacts **28** and **30** of the circuit breaker **10**. In this arrangement, when sufficient electrical current is flowing through this circuit between the contacts **28** and **30**, the bimetallic member **34** is adapted to be heated and to flex upwardly to the position indicated by the broken lines **56** in FIG. **1**, this upward flexing being accompanied by lateral movement of the arms **52** and **54** to the positions indicated by the broken lines **58** and **60** respectively in FIG. **1**. As the construction and function of the bridging contact member **32** is adequately described in the patent mentioned above, the member is not further described herein.

Referring further to FIG. **1**, the thermally responsive bridging contact member **32** in the circuit breaker **10** is resiliently biased for linear movement from the position indicated in FIG. **1** to the position indicated in FIG. **4** by means of a compression spring **62**. One end of this spring **62** abuts the closed end of a socket **64** formed by the casing members **14** and **16**. An additional socket member **66** slidably mounted in the socket **64** then engages the opposite end of the spring **62**, the socket member **66** being engaged with the U-shaped metal strips **40** and **42** of the bridging contact member **32** for biasing the bridging contact member upwardly to open-contacts position as shown in FIG. **4**. As will be be understood, the socket member **66** is formed of a suitably rigid electrically insulating material such as the molded phenolic resin material embodied in the casing members **14** and **16**. Preferably the casing members **14** and **16** are provided with bosses **68** molded therein for engaging the bridging contact member **32** as shown in FIG. **4** for limiting movement of the member in response to the bias of the spring **62**. As the construction and function of the biasing means including the spring **62** are adequately described in the patent mentioned above, these biasing means are not further described herein.

In accordance with this invention, the circuit breaker **10** is provided with a simple, compact, reliable and inexpensive latching mechanism generally indicated at **70** in FIGS. **1—5**. As shown, this latching mechanism includes a bushing member **72** having a pair of flanges **74** and **76** thereon which are interfitted in complementary shaped recesses formed by the casing members **14** and **16** for securely mounting the bushing in a fixed position with respect to the casing member. Preferably, as illustrated in FIG. **3**, the bushing flanges **74** and **76** are provided with flats **78** which, by reason of their interfitting in the complementary shaped recesses formed by the casing members, prevent rotation of the bushing with respect to the casing members. The bushing has a central bore **80** having a portion **82** of a first diameter separated from a second portion **84** of a second diameter by a first annular shoulder **86**, the second portion of the bore being adjacent to a bore portion **88** of relatively larger diameter and being joined to the larger diameter portion by a second shoulder **90**. The bushing **72** is preferably threaded as indicated at **91** to facilitate mounting of the circuit breaker **10** on a control panel or the like.

A manual-operating member **92** for the circuit breaker **10** is then slidably disposed for linear movement in the bushing bore **80**. This operating member has a first portion **94** of a diameter corresponding to the first bore portion **82** and a second portion **96** of a diameter small enough to fit through the bore **80** past the bore shoulder **86** as shown, these operating member portions being separated by a shoulder **95**. The manual operating member is provided with a cylindrical recess **98** at one end thereof and two apertures **100** and **102** extending through the periphery of the operating member open into the recess **98**.

In a preferred embodiment of this invention, the manual operating member **92** is formed of three elements **101**, **103** and **105** which are secured together to form the operating member by a threaded screw **106**. This screw has a head **108** located in a recess **110** in the element **101** and has its opposite end extending through the element **103** and threadedly engaged with the element **105**. In this preferred construction, the upper element **101** of the operating member is preferably formed of a dark colored material while the intermediate element **103** is formed of a light colored material. While the elements **101** and **103** may be formed of metal, these elements may also be formed of plastic materials to permit greater contrast between the colors of the elements. Preferably, a cover member **112**, which may be marked with suitable indicia (not shown), is cemented or otherwise secured in the recess **110** to prevent tampering with the screw **106**. Preferably, also, the operating member **92** is provided with a gripping portion **114** of relatively large diameter and with a shoulder **116** which limits the extent to which the operating member can be moved into the bore **80** of the bushing **72**. In a preferred construction, the operating member **92** and the bushing **72** are provided with respective axial slots **118** and **120** and a detent **122** is forced into the bushing material to extend into the operating member slot, thereby to prevent rotation of the operating member within the bushing. See FIG. **3**.

In accordance with this invention, a helical coil compression spring **124** is disposed within the bushing bore **80** to engage the bushing bore shoulder **86** and the operating member shoulder **95** at opposite ends of the spring **124**, thereby to bias the operating member upwardly as viewed in FIG. **1**.

In accordance with this invention, the latching mechanism **70** further includes a first latching member **126** of generally cylindrical configuration. This latching member has a central, small diameter portion **128** which is located between two larger diameter portions **130** and **132** and which is separated from said larger diameter portions by respective conical cam portions **134** and **136**. These larger diameter portions of the first latching member are proportioned to fit slidably within the recess **98** in the manual-operating member **92** as shown in FIG. **1**. The first latching member **126** further includes a shank portion **138** joined to the larger diameter portion **132** by a shoulder **140**, the shank portion extending out of the operating member recess **98** and having a retaining ring **142** provided at the distal end thereof.

In accordance with this invention, the latching mechanism **70** also includes a second latching member **144** which comprises a washerlike member of rigid, electrically insulating material or the like. This second latching member has a central bore **146**, counterbored at **148** and **150**, which is fitted over the shank portion **138** of the first latching member and which is retained on said shank portion by the retaining ring **142**. A helical coil compression spring **152** fitted over the shank portion of the first latching member is then engaged with the second latching member within the counterbore **148** and with the shoulder **140** on the first latching member, thereby to bias the second latching member away from the conical portions of the first latching member. The second latching member **144** is also provided with a downwardly facing shoulder **154**. For example, in a preferred construction, the shoulder **154** is formed by embedding a metal ring **156** in the molded phenolic resin or other electrical insulating material embodied in the second latching member.

In accordance with this invention, two latching balls **158** are disposed in the apertures **100** and **102** in the operating member, these balls being formed of steel or other suitably rigid material and being proportioned to extend out of the operating member apertures **100** and **102** at both sides thereof.

The operation of the circuit breaker **10** will now be discussed. In this regard, FIGS. **1** and **2** illustrate the circuit breaker **10** in its closed contacts position in which an electrical circuit is formed between the breaker terminals **24** and **26**. That is, as shown in FIGS. **1** and **2**, the bridging contact member **32** has its contacts **48** and **50** engaged with the fixed contacts **28** and **30**, thereby to electrically connect the terminals **24** and **26** through the U-shaped metal strips **40** and **42** and through the bimetallic member **34**. Although the bridging contact member **32** is biased by the spring **62** to move to the open contacts position shown in FIGS. **4** and **5**, the engagement of the arms **52** and **54** of the bridging contact member with the shoulder **154** in the latching mechanism **70** retains the bridging contact member in closed contacts position as shown in FIGS. **1** and **2**. That is, when the manual-operating member is in the depressed position shown in FIGS. **1** and **2**, the latching balls disposed in the operating member apertures **100** and **102** are engaged with the shoulder **90** within the bushing **72**, thereby retaining the operating member in the position shown against the bias of the spring **124**. On the other hand, the latching balls **158** are retained in engagement with the bushing shoulder **90** by the engagement between the balls and the conical cam surface **136** of the first latching member **126**. The first latching member, in turn, is held in engagement with the latching balls by action of the spring **152** which, in the arrangement shown in FIGS. **1** and **2** is compressed between the shoulder **140** on the first latching member and the second latching member **144**. That is, the engagement of the shoulder **154** of the second latching member with the arms **52** and **54** of the bridging contact member compresses the spring **152** so that the latching mechanism **70** retains the circuit breaker **10** in its closed contacts position. Note that in this closed contacts position, only the dark colored element of the manual operating member is visible outside the bushing **72**, thereby giving visual indication that the circuit breaker is in closed circuit position.

If an overload current is then directed through the above-described circuit between the breaker terminals **24** and **26**, the bimetallic member **34** of the bridging contact member **32** becomes heated and flexes upwardly to the position shown by the broken lines **56** in FIG. **1**. When this upward flexing of the bimetallic member occurs, the arms **52** and **54** of the bridging contact member move outwardly to the positions indicated by the broken lines **58** and **60** in FIG. **1**, thereby releasing the engagement of the arms with the shoulder **154** in the latching mechanism **70**. As this engagement is released, the second

latching member **144** first moves downwardly in response to the bias of the spring **152** to engage the retaining ring **142**. At this point, the spring **152** is in its position of repose. The first and second latching members then move downwardly together to release the engagement between the latching balls **158** and the conical surface **136** of the first latching member. As the engagement of the conical surface **136** is released, the latching balls **158** move further into operating member recess **98** releasing their engagement with the bushing shoulder **90**, thereby permitting the operating member, together with the latching balls and with the first and second latching members, to move to the position shown in FIGS. **4** and **5** in response to the bias of the spring **124**. Also, as soon as the arms **52** and **54** of the bridging contact member are released from their engagement with the shoulder **154** in the latching mechanism **70**, the bridging contact member **32** is moved to the open contacts position illustrated in FIGS. **4** and **5** in response to the bias of the spring **62**. As illustrated in FIGS. **4** and **5**, upward movement of the operating member **92** in response to the spring **124** is limited by engagement of the latching balls between the first latching member **126** and the shoulder **86** on the bushing **72**. Upward movement of the bridging contact member in response to the spring **62** is limited by the engagement of the bridging contact member with the bosses **68** in the circuit breaker casing. In the position, shown in FIGS. **4** and **5**, the light-colored element **103** of the operating member **92** is exposed to view outside the bushing **72** giving visual indication that the circuit breaker is in open circuit position.

If the circuit breaker **10** is in closed circuit position as shown in FIGS. **1** and **2** and manual opening of the breaker circuit is desired, the manual operating member **92** need only be pulled with selected force. This pulling on the operating member exerts a corresponding upward force on the latching balls so that the balls are cammed inwardly by the bushing shoulder **90**, this inward movement of the balls camming the first latching member downwardly against the bias of the spring **152**. As soon as the latching balls are cammed inwardly to a sufficient extent to clear the bushing shoulder **90**, the operating member, together with the balls and with the first and second latching members, moves rapidly to open contacts position under the bias of the spring **124**. This movement is accompanied by upward movement of the bridging contact member **32** in response to the bias of the spring **62** for rapidly opening the breaker circuit.

When the circuit breaker is in the open contacts position shown in FIGS. **4** and **5**, the circuit breaker is returned to closed contacts position by merely depressing the manual-operating member **92** against the bias of the spring **124**. Downward movement of the operating member also moves the latching balls and the first and second latching members in the same direction. The shoulder **154** of the second latching member then normally engages the arms **52** and **54** of the bridging contact member **32** for moving the bridging contact member downwardly to closed circuit position against the bias of the spring **62**. As the contacts **48** and **50** initially engage the fixed contacts **28** and **30** while depression of the operating member is continued, the spring **152** is compressed and moves the first latching member upwardly to cam the latching balls **158** out of the operating member recess **98** into latching engagement with the bushing shoulder **90**. However, if manual closing of the circuit breaker is attempted too quickly after the circuit breaker has opened in response to an overload current as above described such that the bimetallic member in the bridging contact member has not sufficiently cooled, downward movement of the manual-operating member will move the second latching member between the arms **52** and **54** on the bridging contact member thereby avoiding movement of the bridging contact member to closed circuit position. In this situation, the spring **152** is not compressed, and the latching balls **158** are not cammed into engagement with the shoulder **90**. As a result, latching of the mechanism **70** cannot be achieved until the bimetallic member **32** has returned to a suitably cool condition.

As alternate embodiment of the circuit breaker of this invention is indicated at **10'** in FIGS. **6** and **7**. Components of the circuit breaker **10'** which correspond to similar components of the circuit breaker **10** are identified by corresponding primed numbers in FIGS. **6** and **7** and are not further described herein. In this alternate embodiment of the circuit breaker of this invention, an even more compact version of the latching mechanism **70'** is achieved by use of an alternate bushing construction as indicated at **160** in FIGS. **6** and **7**. That is, the bushing **160** has a central bore **162** which includes a first portion **164** of relatively small diameter and a second portion **166** of relatively larger diameter, these two bore portions being connected by a shoulder **90'**. A metal bushing ring **168** having a central aperture **170** and a flange **172** is then press-fitted or otherwise secured over an end of the bushing **160** within the casing of the circuit breaker **10'**. In this construction, the manual-operating member **92'** is provided with a first relatively large diameter portion **174** slidably fitted within the first diameter portion **164** of the bushing bore **162**. The manual-operating member is also provided with a second relatively smaller diameter portion **176** joined to the first diameter portion **174** by a shoulder **178**. The manual-operating member is further provided with a cylindrical recess **98'** and with apertures **100'** and **102'** as in the circuit breaker **10** previously described. However, in the circuit breaker **10'**, the apertures **100'** and **102'** are formed in the larger diameter portion of the operating member at a location above the operating member shoulder **178**.

In accordance with this invention, a helical coil compression spring **180** is disposed around the smaller diameter portion of the operating member to engage the shoulder **178** and the ring **168** on the bushing **160**, thereby to bias the operating member **92'** upwardly as viewed in FIG. **6**.

In this arrangement, when the circuit breaker **10'** is in closed contacts position as illustrated in FIG. **6**, the manual-operating member **92'** is retained in the depressed position shown against the bias of the spring **180** by engagement of the latching balls **158'** with the bushing shoulder **90'**. The latching balls **158'** are held in this latching engagement with the shoulder **90'** by engagement between the balls and the conical surface **136'** of the first latching member **126'**. The first latching member **126'**, in turn, is held in its position by engagement of the shoulder **154'** in the second latching member with the arms **52'** and **54'** of the bridging contact member **32'** and by compression of the spring **152'** between the first and second latching members.

When the circuit breaker **10'** is subjected to and an overload current between the breaker terminals **24'** and **26'** so that the second latching member **144'** is released from its engagement with the bridging contact arms **52'** and **54'**, the second latching member moves downwardly under the bias of the spring **152'** until the spring reaches its position of repose thereby releasing the spring force on the first latching member. The upward bias of the spring **180** then cams the latching balls **158'** inwardly so that the balls, now released from any latching force exerted by the first latching member, are released from their latching engagement with the bushing shoulder **90'**. The operating member **92'**, the balls and the first and second latching members then move upwardly in response to the spring **180** while the bridging contact member **32'** moves to its open contacts position in response to the bias of the spring **62'** as shown in FIG. **7**. The circuit breaker **10'** can also be manually opened by pulling on the operating member **92'** and can be manually closed by depressing the operating member in the manner above described as will be understood.

It should be understood that although preferred embodiments of the circuit breaker of this invention have been described by way of illustration, this invention includes all modifications and equivalents thereof falling within the scope of the appended claims.

I claim:

1. A latching mechanism for releasably restraining linear movement of a selected member from a first position to a second position, said mechanism comprising a bushing having a central bore fixedly mounted with respect to said member, and said bushing bore having first and second diameter portions connected by a shoulder which faces said member, an operating member slidable in said bore between first and second positions thereof, said operating member having a recess in one end facing said selected member and having a peripheral aperture opening into said recess, means engaging said bushing and operating member biasing said operating member to said first position thereof, a first latching member having a cam portion slidable in said recess and having a shank portion extending from said recess, a latching ball in said operating member aperture engaging said cam portion of said first latching member, a second latching member slidably mounted on said shank portion of said first latching member, and additional biasing means engaging said first and second latching members biasing said cam portion of said first latching member away from said second latching member, said second latching member manually engaging said selected member for restraining said selected member in said first position thereof and for biasing said cam portion of said first latching member to cam said latching ball into latching engagement with said bushing shoulder for releasably holding said operating member in said first operating member position, said operating member being manually movable toward said second operating member position for camming said latching ball against said bushing shoulder to cam said cam portion of said first latching member toward said second latching member against said additional biasing means to release said latching engagement of said ball and bushing shoulder, thereby to permit said operating member, ball and first and second latching members to move to said second operating member position for releasing said selected member for movement to said second position thereof.

2. A circuit breaker comprising a casing, a pair of contacts mounted on said casing, a member movable between a position bridging said contacts for closing a circuit and a position opening said circuit, said bridging member flexing to a selected extent in response to selected current in said circuit and having a pair of spaced arms which curve apart to a selected extent in response to said flexing of said member, first biasing means mounted on said casing biasing said bridging member to said open circuit position, a bushing having a central bore mounted on said casing, said bore having first and second diameter portions connected by a shoulder which faces said bridging member, an operating member slidable in said bore between open and closed circuit positions, said operating member having a recess in one end facing said bridging member and having a peripheral aperture opening into said recess, second biasing means engaging said operating member and said bushing biasing said operating member to said open circuit position, a first latching member having a cam portion slidable in said recess and having a shank portion extending from said recess, a latching ball in said operating member aperture in engagement with said cam portion of said first latching member, a second latching member slidably mounted on said shank portion of said first latching member, and third biasing means engaging said first and second latching members biasing said cam portion of said first latching member away from said second latching member, said second latching member normally engaging said bridging member arms for holding said bridging member in said closed circuit position thereof and for biasing said first latching member to cam said latching ball into engagement with said bushing shoulder to releasably hold said operating member in said closed circuit position thereof, said second latching member being releasable from engagement with said bridging member arms in response to said arm movement for releasing cammed engagement of said ball with said bushing shoulder and for permitting said operating member and bridging member to move to said open circuit positions.

3. A circuit breaker as set forth in claim 2 wherein said bushing bore has a third diameter portion connected to said first and second bore portions by a second bushing shoulder and wherein said operating member has a first diameter portion slidably engaged with said third bushing bore portion and has a second diameter portion connected to said first operating member portion by an operating member shoulder, said second biasing means comprising a helical compression spring disposed around said second diameter portion of said operating member in engagement with said operating member shoulder and with said second bushing shoulder for biasing said operating member to said open circuit position thereof.

4. A circuit breaker as set forth in claim 2 wherein a ring is attached to said bushing to extend partly over said bushing bore and wherein said operating member has a first diameter portion slidably engaged with said first bushing bore portion and has a second diameter portion connected to said first operating member portion by an operating member shoulder, said second biasing means comprising a helical compression spring disposed around said second operating member portion in engagement with said bushing ring and with said operating member shoulder for biasing said operating member to said open circuit position thereof.