

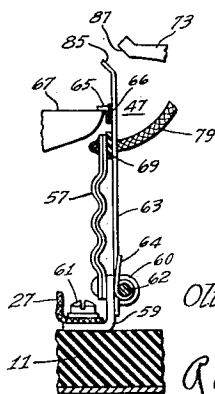
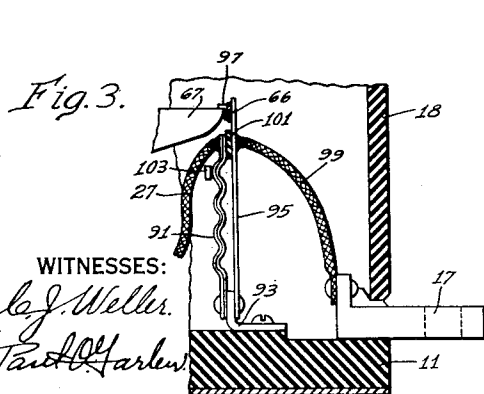
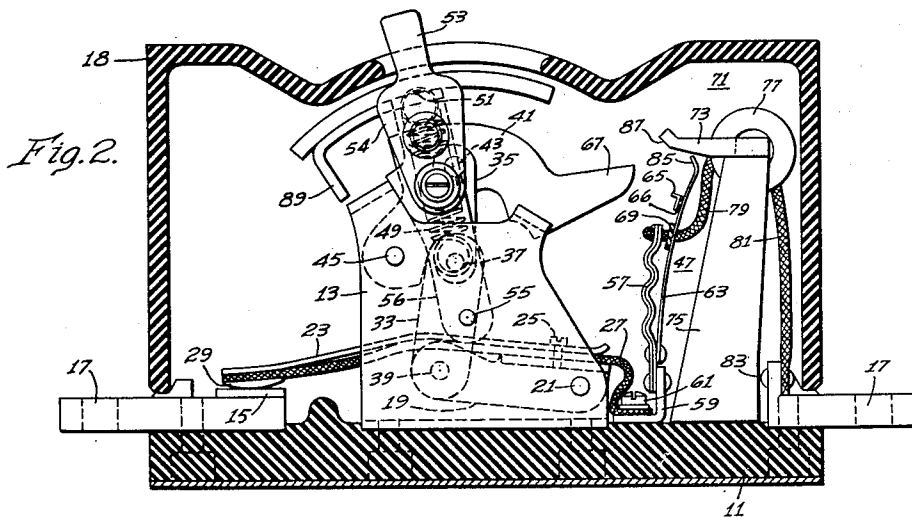
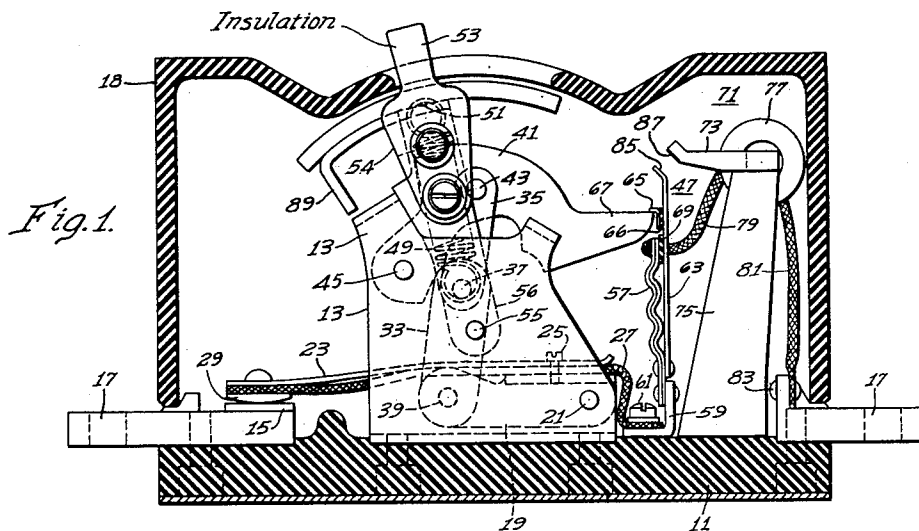
Oct. 17, 1944.

O. S. JENNINGS

2,360,684

CIRCUIT BREAKER

Filed Oct. 30, 1941



WITNESSES:

W. J. Wells.
T. A. Harlow.

INVENTOR

Oliver S. Jennings.

BY

Ralph J. Swingle
ATTORNEY

UNITED STATES PATENT OFFICE

2,360,684

CIRCUIT BREAKER

Oliver S. Jennings, Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application October 30, 1941, Serial No. 417,159

23 Claims. (Cl. 200—88)

This invention relates to circuit breakers and more particularly to circuit breakers of the type which are automatically operated instantaneously on heavy overloads or short circuits, and after a time delay on persistent overloads of less magnitude.

One object of the invention is to provide a circuit breaker having an improved trip mechanism comprising an electromagnetic and a bimetallic trip means for causing opening of the circuit breaker in response to overloads of differing magnitude wherein the magnet armature moves at all times free of the stationary core of the electromagnet.

Another object of the invention is to provide a circuit breaker embodying an electromagnetic trip means and a bimetallic trip means for opening the circuit in response to overload currents of differing magnitudes wherein the armature for the electromagnet is mounted for movement with the bimetallic element and at times independently of the bimetallic means to trip the breaker.

Another object of the invention is to provide an improved circuit breaker having a trip device including a bimetal element and magnetic means operable to trip the breaker and disposed to permit the bimetal element to flex a maximum amount without opposition by the magnetic means whereby the bimetal element is not subjected to any opposing force when it is being heated a maximum amount.

Another object of the invention is to provide a circuit breaker with an improved trip device wherein an electromagnet first exerts a force to move a latch member in unlatching direction and arranged so that the unlatching force produced by the electromagnet decreases as the armature approaches the core of the electromagnet.

Another object of the invention is to provide a circuit breaker with a novel trip device wherein excessive current flowing in one direction through a thermal element and in the opposite direction through an adjacent latch member generates an electromagnetic force to instantaneously trip the breaker on heavy overloads.

The novel features that are considered characteristic of the invention are set forth in particular in the appended claims. The invention itself, however both as to structure and operation, together with additional objects and advantages thereof will be best understood from the following detailed description of several embodiments thereof when read in connection with the accompanying drawing, in which:

Figure 1 is an elevational view, partly in sec-

tion, of a circuit breaker embodying the principles of the invention, the parts being shown in the closed circuit position;

Fig. 2 is an elevational view, partly in section, showing the circuit breaker after it has been tripped by the electro-responsive trip device and before the contacts have opened;

Fig. 3 is a fragmentary detail view showing a modified form of the trip device, and

Fig. 4 is a fragmentary view showing a modified method of mounting the latch member.

Referring to the drawing, the circuit breaker comprises a base 11 of insulating material upon which is mounted a U shaped supporting frame 13, a stationary contact 15 and a pair of terminals 17. A cover 18 of molded insulating material is removably mounted on the base 11 and cooperates therewith to form an enclosing casing for the parts of the circuit breaker. A channel shaped movable contact arm 19 is pivotally mounted on a pivot pin 21 supported in the frame 13 between the sides thereof, and a resilient contact arm 23 is secured to the arm 19 by means of a screw 25 which also serves to connect a flexible conductor 27 to the contact arm 19. A contact 29 is secured to the free end of the resilient contact arm 23 and one end of the flexible conductor 27 is clamped between the contact arm 23 and the contact 29.

The contact arm 19 is actuated by means of a toggle comprising toggle links 33 and 35 which are pivotally connected together by a knee pivot pin 37, the toggle link 33 being pivotally connected to the contact arm 19 by a pivot pin 39 and the toggle link 35 being pivotally connected to a lever or cradle 41 by a pivot pin 43.

The cradle 41 is mounted on the frame 13 for oscillatory movement about a pivot pin 45 supported on the frame 13, and is releasably retained in its operative position shown in Fig. 1 by means of a current responsive trip device 47 which will be described later.

When the toggle links 33 and 35 are in the straightened position, as shown in Fig. 1, they serve to retain the contact arm 19 in closed circuit position wherein the movable contact 29 is in engagement with the stationary contact 15. An overcenter spring 49 tensioned between the knee pivot pin 39 of the toggle 33—35 and a pin 51 on an operating handle 53 is provided to operate the toggle 33—35 to open and to close the contacts. The operating handle 53 is of molded insulating material and has a bifurcated portion 54 which is secured to a U shaped operating lever

56 that straddles the frame 13 and is pivoted to the side walls of the frame by pivots 55.

Clockwise movement of the handle 53 as viewed in the drawing causes the line of action of the spring 49 to move to the right of the center line 39—43. This causes collapse of the toggle 33—35 and moves the contact 29 to the open position with a snap action. Movement of the operating handle 53 in a counterclockwise direction from its open position to its closed position causes the line of action of the overcenter spring 49 to move to the left (Fig. 1) of the center line 39—43 which applies the force exerted by the spring 49 in a direction to straighten the toggle 33—35 and close the contacts.

When the cradle 41 is released by the trip device 47 in response to an overload or short circuit condition in the circuit traversing the breaker, the spring 49 causes the cradle 41 to rock in a counterclockwise direction carrying the pivot 43 to the left of the line of action of the spring 49. In this position the spring 49 causes collapse of the toggle 33—35 and opens the contacts irrespective of the position of the operating handle.

The trip device 47 for the circuit breaker comprises a corrugated bimetallic element 57 secured at its inner end to an angular bracket 59 which is secured to the base 11 of the breaker by means of the screw 61. One end of the flexible conductor 27 is secured to the bracket 50. A resilient latch member 63 of magnetic material is secured to the bimetal element 57, by means of rivets, at a point near the bracket 59. A latch 65 secured to the latch member 63, but insulated therefrom by an insulating plate 66, cooperates with the latch end 67 of the cradle 41 to normally releasably restrain the cradle in its operative position shown in Fig. 1. An insulating plate 69 secured to the latch member 63 insulates the latch member from the bimetal element 57 so that the latch member is not traversed by the current flowing in the circuit of the breaker.

Under normal circuit conditions the bimetal element 57 and the latch member 63 will remain in the latching position, however, upon the occasion of a persistent overload the bimetal element 57 will be heated by the excess current flowing therethrough. When the bimetal element is heated a predetermined amount it flexes toward the right and moves the latch member 63 with it thereby causing the latch 65 to disengage the latch end 67 of the cradle 41 which is then moved to open the contacts in the manner set forth previously.

After the circuit is interrupted the bimetal element 57 cools and resumes its normal position. The latch member 63 follows due to its inherent resiliency and resumes its latching position.

The latch member 63 may be mounted on the bracket 59 on the side thereof opposite the bimetal 57 with equal effectiveness.

The breaker is tripped open instantaneously by magnetic action on overloads above a predetermined amount or on short circuits, by means of an electromagnet 71 comprising a stationary U-shaped core 73 mounted on a supporting frame 75 of non-magnetic material secured to the base 11 of the breaker. The winding 77 of the electromagnet 71 is connected in series relation with the bimetal element and the contacts 15 and 29 in the circuit of the breaker by means of a flexible conductor 79 having one end connected to the free end of the bimetal element 57, and a conductor 81 connected to the terminal 17 by a screw 83.

On persistent overload current below the afore-

mentioned predetermined value the bimetal element provides a time delay during which the circuit conditions may return to normal. On heavy overloads or short circuits the breaker is tripped open substantially instantaneously by energization of the electromagnet 71, which attracts the latch member 63 causing it to flex independently of the bimetal 57 in a direction to release the cradle 41. During the interval between the occurrence of the overload and interruption of the current the bimetal is heated in response to overloads such as short circuits. As soon as the contacts 15—29 are opened and the circuit interrupted the magnet is deenergized, and the bimetal cools and returns to its normal position allowing the latch member 63 to return to latching position by virtue of its inherent resiliency.

One of the important features of the invention is the freedom of movement of the bimetal element 57 as it flexes in an unlatching direction when heated in response to overload currents. This is effected by disposing the magnet core 73 out of the path of travel of the magnetic latch member or armature 63. This construction has the additional advantage of permitting the use of a short air gap yet at the same time allows the latch member or armature, when operated magnetically, to move out of the path of the bimetal element. Also the spring force of the latch member is prevented from opposing the flexing of the bimetal element when it is hot. The end of the latch member 63 and of the legs of the magnet core 73 are shaped as at 85 and 87 respectively to form substantially parallel faces, the portion 85 acting as an armature. This causes the core 73 to exert a strong tangential pull on the armature 85 to unlatch the carrier 41 but permits the armature to travel freely past the core 73 when it is operated by the bimetal element 57. During the time interval between the tripping action and the mechanical opening of the contacts the excessive current continues to flow through and heat the bimetal element, and the bimetal continues to flex beyond the tripping point. If the flexing of the bimetal is opposed by any substantial force such as if it strikes a stop or is opposed by the resilient force of the member 63 while the bimetal is hot it will take a set which will destroy its calibration. For this reason the latch member 63 is disposed to move clear of the core 73 both when operated electromagnetically and by the bimetal element.

During the time interval between the release of the operating mechanism by the electromagnet and the mechanical opening of the contacts in response to high magnitude overloads or short circuits the flow of high magnitude current heats the bimetal element to a very high degree, the bimetal at times becoming red hot. Under such extreme heat the bimetal element flexes rapidly and any substantial force opposing the flexing tends to give the bimetal a set. Under such conditions it is desirable to prevent even the light tension of the latch member from opposing the flexing of the bimetal. This is effected by the arrangement of the magnet core 73 and the armature 85. As previously stated, when the winding 77 is energized the legs 87 of the core 73 exert a tangential pull on the armature 85 causing the latch member 63 to flex to approximately the position shown in Fig. 2 in which it is beyond the maximum movement of the bimetal element. As soon as the tip of the portion 85 has passed the portion 87 of the core the direction of the mag-

netic pull is changed to a line substantially radially of the unlatching movement of the latch member 63, thus holding the latch member in its Fig. 2 position until the circuit is interrupted and the coil 77 is deenergized. As soon as the circuit is interrupted the bimetal starts to cool and to recover its normal position. Also deenergization of the coil 77 permits the latch member 63 to spring back into contact with bimetal 57. However, by this time the danger of the bimetal taking a set has passed.

On the occurrence of an overload of lesser magnitude the bimetal element has to overcome only the light latch load and the light tension of the latch member 63 which permits the bimetal to flex as far as necessary without taking a set.

After the circuit breaker has been tripped open either by the bimetal element 57 or by the electromagnet 71, the mechanism is reset by moving the operating handle 53 in a clockwise direction to its "off" position during which movement a member 89 attached to the operating handle engages the carrier 41 and moves the latching end 67 thereof into latching engagement with the latch 65. Counterclockwise movement of the handle to its "on" position then closes the contacts in the manner previously described.

The latch member 63 may be pivotally mounted as illustrated in the embodiment shown in Fig. 4 wherein the bracket 59 is provided with a pair of ears 60 (only one being shown) on which the latch member 63 is pivotally supported by means of a pivot pin 62. A coil spring 64 having one end bearing against the latch member and the other end seated against the bracket 59 biases the latch member 63 in a counterclockwise or latching direction. The operation of this modification of the invention is the same as that of the original embodiment previously described.

Fig. 3 illustrates a modified form of the invention wherein the electromagnet 73-77 is omitted. The circuit extends in series relation through the bimetal element and the resilient latch member. The repelling action of a comparatively heavy overload current traversing the loop formed by the bimetal and the armature is sufficient to cause tripping of the breaker on heavy overload currents or short circuits.

Referring to Fig. 3, a bimetal element 91 is secured to a bracket 93 to which is also secured a resilient latch member 95, the parts being disposed one on each side of the bracket and secured thereto by rivets or other suitable fastening means. The bracket 93 is secured to the base 11 of the circuit breaker by means of a screw. The free end of the latch member 95 carries a latch 97 which is insulated therefrom and which is normally in latching engagement with the latch end 67 of the carrier 41. The circuit breaker mechanism is the same as that of the circuit breaker shown in Fig. 1.

The flexible conductor 27 is electrically connected to the free end of the bimetal element 91 and a flexible conductor 99 electrically connects the free end of the latch member 95 to the adjacent terminal 17. A plate 101 of insulating material is secured to the latch member 95 and disposed between the bimetal element and the latch member.

The path of the current through the modified form of the trip device shown in Fig. 3 extends through the circuit breaker contacts, the flexible conductor 27, the bimetal element 91, the bracket 93, the latch member 95 and the flexible conductor 99 to the terminal 17.

When heated a predetermined amount in response to overload currents below a predetermined value, for example below ten times normal current, the bimetal element flexes in the usual manner and moves the latch member 95 toward the right or in a direction to cause the latch 97 to release the carrier 41. On overload currents above the predetermined value or on short circuits, the repelling force generated by the heavy current flowing in opposite directions through the bimetal element 91 and the latch member 95 is sufficient to cause flexing of the resilient latch member to substantially instantaneously trip the breaker.

In the embodiment of the invention illustrated in Fig. 3 the bimetal element 91 is considerably stiffer than the latch member 95 so that the reaction of the repelling force will be directed to operation of the latch member 95 without substantially deflecting the bimetal element in the opposite direction. If desired a stop 103 may be disposed to the left of the bimetal element to prevent any reaction of the bimetal toward the left. As in the case of the previously described embodiments the bimetal element of the Fig. 3 embodiment is free to deflect as far as it wants to without substantial restraint.

Having described several embodiments of the invention in accordance with the patent statutes, it is to be understood that various changes and modifications may be made in the structural details disclosed without departing from some of the essential features of the invention. It is, therefore, desired that the language of the appended claims be given as reasonably broad interpretation as the prior art permits.

I claim as my invention:

1. In a circuit breaker, relatively movable contacts, operating means therefor, a bimetal element heated in response to the current of the circuit, a resilient magnetic member separate from said bimetal element movable to cause opening of said contacts, said member being movable by said bimetal element when said element is heated a predetermined amount and also being movable independently of and relative to the bimetal element by electromagnetic action upon the occurrence of overload currents above a predetermined amount.

2. In a circuit breaker, relatively movable contacts, biasing means for moving one of said contacts to open position, a latch member of resilient material for releasably restraining said biasing means in operative position, a bimetal operable when heated a predetermined amount to move said latch member, said latch member being rigidly secured at one of its ends to a fixed support, the free end of said latch member being movable relative to said bimetal element, and said latch member being movable independently of movement of said bimetal to release the biasing means on overload currents above a predetermined value.

3. In a circuit breaker, relatively movable contacts, means releasable to cause movement of one of said contacts to open position, trip means including a bimetal element, a resilient latch member separate from said bimetal element disposed substantially parallel to said bimetal element for releasably restraining the releasable means, said latch member having one end mounted on a fixed support, said bimetal being operable in response to overload currents below a predetermined value to flex said resilient latch member to release the releasable means, and

electromagnetic means operable in response to overload currents above said predetermined value to attract and flex the resilient latch member independently of the bimetal element and relative thereto to release the releasable means, said latch member having a part of magnetic material forming the armature for the electromagnetic means.

4. In a circuit breaker, relatively movable contacts, operating mechanism for said contacts including a member releasable to cause opening of said contacts, a trip device including a bimetal element heated in response to the current of the circuit through the breaker, a movable latch member separate from but having a common mounting with said bimetal element for releasably restraining the releasable member, said bimetal element being operable when heated a predetermined amount to move the latch member to release said releasable member, and an electromagnet having a core member disposed out of the path of the latch and operable in response to overload currents above a predetermined value to attract and move said latch independently of the bimetal element, said latch member having a portion of magnetic material forming an armature for said electromagnet.

5. In a circuit breaker, relatively movable contacts, operating mechanism for said contacts, a trip device including a bimetal element heated in response to the current of the circuit through the breaker, a latch member operable by said bimetal element when said element is heated a predetermined amount for causing an opening operation of the operating mechanism, said latch member and said bimetal being rigidly mounted at one end on a common support and an electromagnet having a fixed core member disposed out of the path of travel of said latch member, said latch member having a portion of magnetic material forming the armature for the electromagnet, said electromagnet being operable in response to predetermined conditions to move said latch member relative to the bimetal element to cause opening operation of the breaker, said latch member and electromagnet permitting said bimetal element to deflect its maximum amount in response to heating thereof by overload currents without obstruction.

6. In a circuit breaker, the combination of relatively movable contacts, a releasable operating mechanism for causing automatic opening of the contacts, a latch member having one end immovably mounted on a fixed support and operable to release said operating mechanism, a bimetal element having one end immovably mounted on said fixed support, said bimetal element being responsive when heated a predetermined amount to operate the latch member, said latch member and said bimetal element having substantially the same path of movement, an electromagnet having a core member disposed out of the path of movement of the latch member, said latch member having a part of magnetic material forming the armature for said electromagnet, said electromagnet being responsive to overload currents above a predetermined value to operate the latch independently of the bimetal element, and said latch and electromagnet permitting unobstructed maximum deflection of the bimetal element in response to the heating of said bimetal element by overload currents.

7. In a circuit breaker, the combination of a releasable operating mechanism for the breaker,

a latch member of conductive material operable to release the operating mechanism, a thermal element responsive when heated a predetermined amount to operate the latch member, said thermal element and the latch member being disposed in substantially parallel relation and being electrically connected in series relation in the circuit of the breaker and being electro-dynamically responsive to overload currents above a predetermined value to cause release of the operating mechanism.

8. In a circuit breaker, the combination of a releasable operating mechanism for the breaker, a latch member for releasably restraining the operating mechanism, and a thermal element disposed in substantially parallel relation to said latch member, said latch member and said thermal element being electrically connected in series relation with each other in the circuit of the breaker and being electro-dynamically responsive to overload currents to cause release of the operating mechanism.

9. A circuit breaker comprising relatively movable contacts, operating means therefor, a member movable to cause opening of said contacts, and a thermal element responsive when heated a predetermined amount to move said member, said member and said thermal element being physically disposed substantially parallel to each other and being electrically disposed in series relation with each other in the circuit of the breaker and being electromagnetically responsive to overload currents above a predetermined value to magnetically move said member.

10. In a circuit breaker the combination of releasable operating mechanism for causing automatic operation of the breaker, a bimetallic thermally responsive trip element, a latch member of resilient material having one end rigidly secured to a fixed support, said latch member being flexed by said trip element to cause release of the operating mechanism, and electromagnetic means for flexing said resilient latch member relative to the trip element.

11. In a circuit breaker, relatively movable contacts, a movable member biased to open said contacts, a trip device comprising a bimetal element traversed by and heated in response to the current flowing in the circuit, a latch member disposed substantially parallel to said bimetal element and having one end electrically connected to one end thereof and having its other end electrically connected in the circuit, said element when heated a predetermined amount in response to overloads of predetermined magnitude moving said latch member to release the movable member, and said latch member being electro-dynamically moved relative to said bimetal element in response to overload currents of higher predetermined value to release the movable member.

12. In a circuit breaker, relatively movable contacts, means for automatically moving one of said contacts to open position, a latch member comprising a strip of resilient material biased to latching position and operable to cause opening of said contacts, a bimetal element operable when heated a predetermined amount to operate said latch member, said latch member being non-movably secured to a fixed support at one end, the free end of said latch being movable relative to said bimetal element, and said latch member being movable independently of movement of the bimetal in response to over-

load currents above a predetermined value to cause opening of the contacts.

13. A circuit breaker comprising relatively movable contacts, operating mechanism therefor, a member movable to cause opening of the contacts, a current responsive bimetal element heated in response to the current of the circuit and operable to move said member, means for producing a magnetic force acting directly on said member to move said member relative to said bimetal element in response to currents above a predetermined value, said member forming a part of the means for producing said magnetic force, said member being movable an amount at least sufficient to permit deflection of the bimetal element the maximum amount it will deflect, in response to overload currents whereby the bimetal element will return to its original shape and normal position after maximum heating thereof by overload currents.

14. A circuit breaker comprising relatively movable contacts, operating mechanism therefor, a latch member biased to a normal position and movable to effect opening operation of said mechanism, a current responsive bimetal element heated in response to the current of the circuit and operable to move said member, means for producing a magnetic force acting directly on said member to move said member relative to said bimetal element in response to currents above a predetermined value, said latch member forming a part of the means for producing said magnetic force, said latch member being movable by said magnetic means an amount at least sufficient to remove the biasing force from the bimetal and to permit deflection of the bimetal element the maximum amount it will deflect in response to overload currents, whereby the bimetal element will return to its original shape and to its normal position after maximum heating thereof by overload currents.

15. A circuit breaker comprising relatively movable contacts, operating mechanism for said contacts, a trip device including a bimetal element heated in response to the current through the circuit of the breaker, a latch member of resilient material biased to latching position, said latch member being flexed by said bimetal element when said element is heated a predetermined amount for causing an opening operation of the operating mechanism, and an electromagnet having a fixed core member disposed out of the path of travel of said latch member, said electromagnet being operable in response to overloads above a predetermined value to flex said latch member relative to said bimetal element to an unlatched position, said latch member having a portion of magnetic material forming an armature for said electromagnet.

16. A circuit breaker comprising relatively movable contacts, biasing means for moving one of said contacts to open position, a trip device including a thermal element, a latch member of resilient material separate from said thermal element for releasably restraining the biasing means in operative position, said latch member being flexed by said thermal element when said element is heated a predetermined amount to release the biasing means and also being flexed electromagnetically relative to said thermal element by overload currents above a predetermined amount to release the biasing means.

17. In a circuit breaker, relatively movable contacts, a trip device comprising a bimetal element mounted on a support and heated in re-

sponse to the current of the circuit, a member movable to effect tripping operation of the breaker, said member being mounted on the support independently of said bimetal element and being moved by the bimetal element when said element is heated a predetermined amount, said member also being moved relative to the bimetal element by electrodynamic action upon the occurrence of overload currents above a predetermined value, said bimetal element being capable of deflecting its maximum amount without obstruction when heated by overload current.

18. In a circuit breaker provided with separable contacts and means releasable to effect separation of said contacts, current responsive means for effecting release of said releasable means in response to an overload current in the circuit of the breaker, said current responsive means comprising a fixedly mounted magnetic core member, means for energizing said core member in response to overload currents, and an armature comprising a strip of resilient material having one end movable toward said core member to effect release of said releasable means, said core member being immovably mounted and disposed to permit the armature to flex a greater distance than the air gap between said core member and said armature at the instant of initial armature movement.

19. In a circuit breaker provided with separable contacts and means releasable to effect separation of said contacts, electroresponsive means for effecting release of said releasable means in response to an overload current above a predetermined value in the circuit of the breaker, said electroresponsive means comprising a fixedly mounted magnetic core member, means for energizing said core member in response to overload currents, an armature comprising a strip of resilient material having one end movable toward said core member to effect release of said releasable means, and current responsive thermal means operable when heated a predetermined amount in response to overload currents to flex said armature toward said core member to effect release of said releasable means, said core member being immovably mounted and disposed to permit the armature to flex a greater distance than the air gap between said core member and said armature at the instant of initial armature movement.

20. A circuit breaker comprising relatively movable contacts, biasing means for moving one of said contacts to open position, a trip device including a thermal element electrically connected in the circuit to have current flow there-through, a latch member of resilient material separate from but having a common mounting with said thermal element for releasably restraining the biasing means in operative position, said latch member being flexed by said thermal element when said element is heated a predetermined amount to release the biasing means and also being flexed electromagnetically relative to said thermal element by magnetic flux set-up due to the current flow in the thermal element when there are overload currents above a predetermined amount to release the biasing means.

21. A circuit breaker comprising relatively movable contacts, biasing means for moving one of said contacts to open position, a trip device including a thermal element of bimetallic material mounted at one end and movable laterally at its other end, a latch member of resilient

material separate from said thermal element for releasably restraining the biasing means in operative position, said resilient latch member being rigidly mounted together with the mounted end of said thermal element on a common support and extending generally parallel to the thermal element, said resilient latch member being flexed by the lateral movement of said thermal element when said element is heated a predetermined amount to release the biasing means and also being flexed electromagnetically relative to said thermal element by overload currents above a predetermined amount to release the biasing means.

22. In a circuit breaker, relatively movable contacts, means releasable to cause movement of one of said contacts to open position, trip means including a strip of bimetallic material electrically connected in the circuit to be traversed by current and a strip of resilient material disposed generally parallel to the strip of bimetallic material, said two strips being fixedly mounted together at one end and each being laterally movable at its other end, a latch portion on said strip of resilient material adjacent its laterally movable end for normally holding said releasable means, an insulated connection between the laterally movable ends of said strips through which said resilient strip is flexed upon heating of the bimetallic strip to move said latch portion to releasing position, and said resilient strip being flexed magnetically due at least in part to

the magnetic flux set up by the current flow through the bimetallic strip to move said latch portion relative to said bimetallic strip upon the flow of a heavy overload current to release said releasable means and cause opening of the contacts.

23. In a circuit breaker, relatively movable contacts, means releasable to cause movement of one of said contacts to open position, trip means including a strip of bimetallic material electrically connected in the circuit to be traversed by current and a strip of resilient material disposed generally parallel to the strip of bimetallic material, a common support on which one end of each of said strips is rigidly mounted, the other end of each of said strips being laterally movable, a latch portion on said strip of resilient material adjacent its laterally movable end, a piece of insulating material adjacent the laterally movable end of said resilient strip engageable by said bimetallic strip upon heating thereof by an excess current to flex the resilient strip to move said latch portion to releasing position but permitting movement of said resilient strip and its latch portion relative to said bimetallic strip, and said resilient strip being magnetically responsive to flex and move its laterally movable end relative to said bimetallic strip upon the occurrence of heavy overload currents.

OLIVER S. JENNINGS.