Dec. 6, 1938. H. S. GANO 2,139,265

CIRCUIT BREAKER

Filed Oct. 21, 1936 2 Sheets-Sheet 1

Fig. 1.

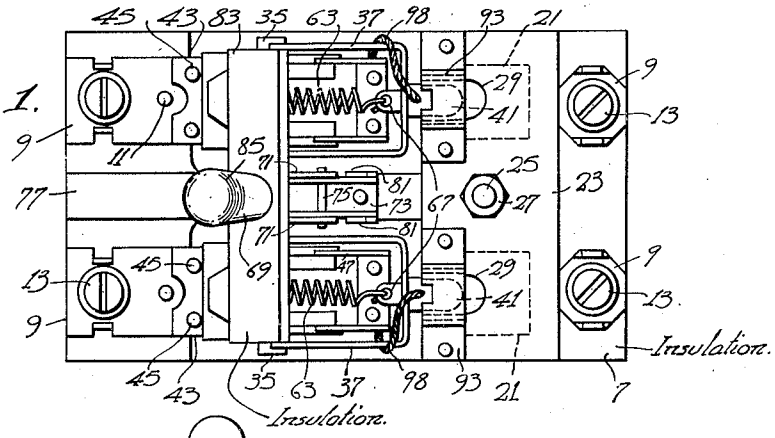


Fig. 2.

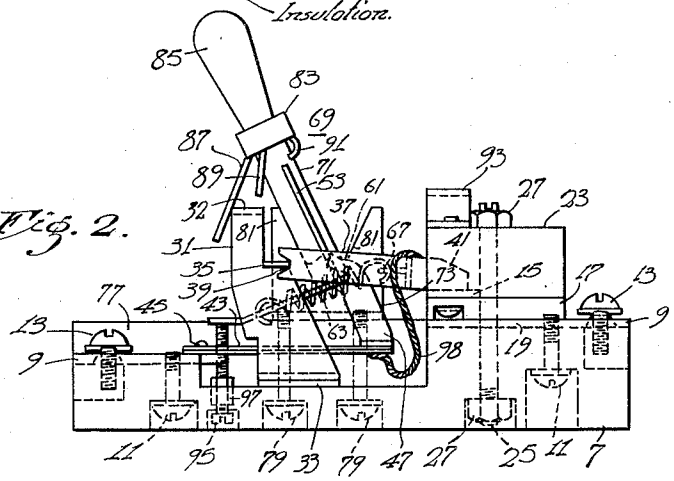
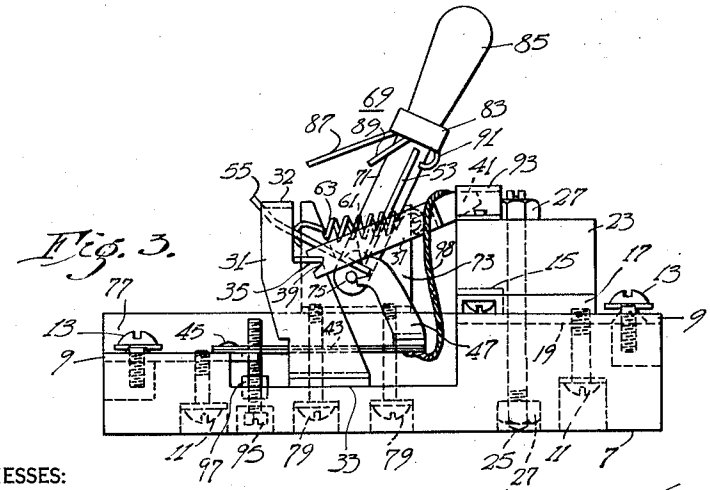


Fig. 3.



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CIRCUIT BREAKER

Filed Oct. 21, 1936 2 Sheets-Sheet 2

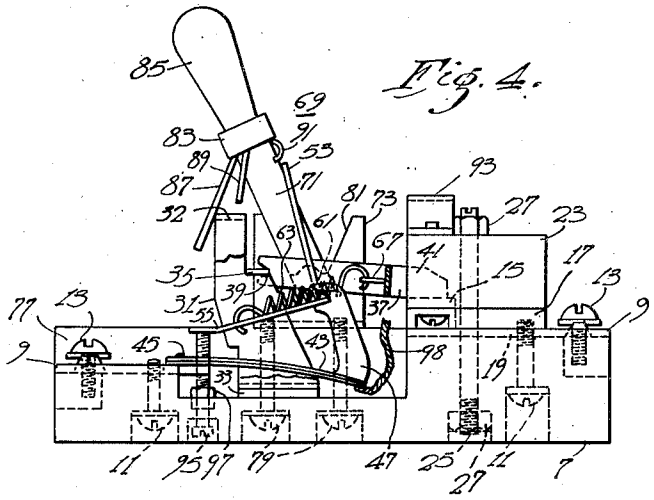

Fig. 4.

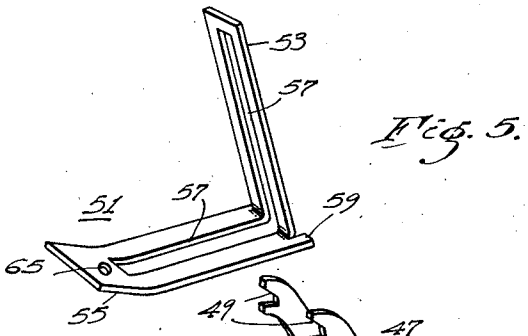

Fig. 5.

Fig. 6.

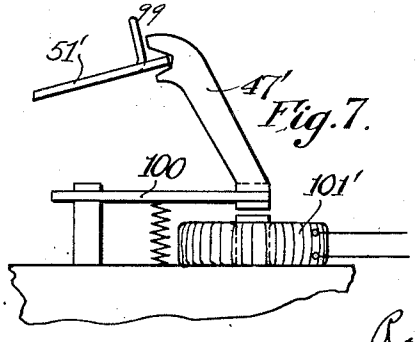

Fig. 7.

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2,139,265

CIRCUIT BREAKER

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Application October 21, 1936, Serial No. 106,782

23 Claims. (Cl. 200—116)

My invention relates to circuit breakers, in general, and more particularly, to quick-acting thermostatically controlled circuit breakers suitable for use in controlling lighting and distribution feeder circuits.

My invention is a modification of the circuit breaker shown in the application of O. S. Jennings, Serial No. 712,577, filed February 23, 1934 and embodies some of the features of that device.

One object of my invention is to provide an improved quick-acting thermostatically controlled circuit breaker that will be simpler and less expensive to manufacture than the previously known devices of the general type.

Another object of my invention is to provide an improved snap-acting circuit breaker that will automatically move to the open-circuit position upon the occurrence of predetermined current conditions in the controlled circuit, independently of the position of the operating handle.

Another object of my invention is to provide an improved circuit breaker which requires a minimum number of parts.

Another object of my invention is to provide an improved actuating mechanism for a circuit breaker which is, in part, pivotally supported on the bimetallic trip element of the breaker.

Another object of my invention is to provide an improved actuating mechanism for a circuit breaker embodying an overcenter spring for moving the movable contact to open or closed circuit position, in which the bimetallic trip element controls the line of action of the overcenter spring.

Another object of my invention is to provide an improved actuating and tripping means for a circuit breaker together with a simple and accurate adjusting means for adjusting the tripping characteristic of the breaker.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to structure and operation, together with additional objects and advantages thereof, will best be understood from the following detailed description of a specific embodiment when read in connection with the accompanying drawings, in which:

Figure 1 is a plan view of the circuit breaker embodying the features of my invention;

Fig. 2 is a side elevational view of the circuit breaker illustrated in Fig. 1 with the contact means thereof in the closed-circuit position;

Fig. 3 is a side elevational view of the circuit breaker illustrated in Fig. 1, with the contact means thereof in the open-circuit position;

Fig. 4 is a side elevational view of the circuit breaker illustrated in Fig. 1 at an instant just prior to movement of the contact means thereof to the open-circuit position in response to an overload condition;

Fig. 5 is a perspective view of an actuating member of the circuit breaker;

Fig. 6 is a perspective view of the current-responsive bimetallic trip element and the support carried thereby; and

Fig. 7 is a fragmentary view of a modified form of tripping means.

Referring now to the drawings, the circuit breaker illustrated therein is of the two-pole type and comprises, in general, a base, a plurality of terminals, contact means, actuating means for the contact means, a common operating member for controlling the actuating means, and a pair of current-responsive trip elements for also controlling the actuating means.

The base 7 for the circuit breaker is constructed of any suitable molded insulating material. Two pairs of end terminals 9, one pair for each pole of the circuit breaker, are mounted in recesses provided therefor in the base 7. The end terminals may be secured to the base in any suitable manner, as for example, by means of the threaded bolts 11, which pass through openings provided therefor in the base 7 and engage in threaded openings provided in the end terminals. Each of the end terminals is provided with an additional threaded opening for receiving cap screws 13, by means of which the line and load conductors are adapted to be connected to the end terminals.

Since the structure of the various elements and mechanisms for each pole of the breaker are identical, a detailed description of these elements and mechanisms for only one pole of the circuit will be given.

A stationary contact 15 is mounted in a recess provided in a common insulating plate 17, which extends across both poles of the circuit breaker. The contact 15 is connected to its corresponding end terminal by means of a conductor 19, which may be formed as an integral part of the end terminal.

Arc extinguishing means 21 of the spaced-plate type are mounted in a common insulating support 23 which extends across the two poles of the breaker and is secured to the base by means of a bolt 25 and nuts 27. The particular structure of the arc-extinguishing means is not an impor-

tant part of my invention, and any suitable type of arc-extinguishing means may be used. The plates of the arc extinguisher and the support therefor are provided with recesses 29 to form a path for the movable contact.

A U-shaped main frame 31 is provided for each pole of the circuit breaker, and is mounted on a plate 33. The plate 33 and the main frame 31 are adapted to be secured to the base in any suitable manner, as for example, by means of threaded bolts not shown. The main frame has a pair of lugs 35 struck outwardly from each leg thereof for pivotally mounting a U-shaped movable contact support 37. The ends of the legs of the U-shaped movable contact support are bifurcated, as shown in Figs. 2, 3 and 4, in order to receive the lugs 35. The lugs 35 form a pivot axis or pivot point 39 for the U-shaped movable contact support 37. A movable contact 41 is secured to the center of the bight of the U-shaped contact support 37 for cooperation with its corresponding stationary contact 15.

A current-responsive trip device in the form of a bimetallic trip element 43, has one end secured to the end terminal 9 by means of rivets 45. The free end of the bimetallic trip element has a U-shaped support 47 secured thereto in any suitable manner. The ends of the legs of the U-shaped support 47 are bifurcated as shown at 49 (Fig. 6) for receiving a movable contact actuating member, which will now be described.

The movable contact actuating member indicated generally at 51 (Fig. 5) comprises a strip of metal bent in the form of an angle to provide legs 53 and 55. The actuating member 51 has a centrally disposed elongated slot 57 formed therein to accommodate an overcenter spring which will be hereinafter described. Offset projections 59 are formed integral with the actuating member at the junction of the legs 53 and 55 thereof. The projections 59 are adapted to seat in the bifurcations 49 provided at the ends of the legs of the U-shaped support 47. It will thus be seen that the actuating member 51 is pivotally mounted on the support 47 on an axis or point indicated at 61 in Figs. 2, 3 and 4.

An overcenter spring 63 has one end thereof secured in an opening 65 at the free end of the leg 55 of the actuating member 51, and its other end secured to a lug 67 secured to the bight of the U-shaped movable contact support 37. A common operating means indicated generally at 69 is provided for simultaneously moving the actuating members 51 of each pole of the circuit breaker. The common actuating means comprises the U-shaped operating member 71, the ends of the legs of which are pivotally mounted on a U-shaped support 73 between the mechanisms of the two poles by means of a pivot pin 75 (see Fig. 1). The U-shaped support 73 is secured to a centrally disposed longitudinal flange 77 formed integral with the base 7, by means of threaded bolts 79 which pass through the base and flange and engage in threaded openings provided in the U-shaped support 73. The legs of the U-shaped support are offset and bifurcated to form stops 81 for limiting movement of the operating member 71. An insulating bar 83 is secured to the top of the bight of the operating member 71 and extends across both poles of the circuit breaker. A handle 85 is secured adjacent the center of the insulating bar 83 to form a means whereby the operating member 71 may be manually controlled. Angle pieces 87 are secured to the underside of the insulating bar 83 over each pole of the circuit breaker. Each angle piece 87 has a pair of depending lugs 89 struck downwardly therefrom, and a depending hook lug 91 formed on the forward end thereof. The depending lugs 89 and the hook lug 91 are adapted to engage and move the leg 53 of the actuating member 51 when the operating member 71 is moved about its pivot pin 75.

Opening movement of the movable contacts 41 is limited by means of stop brackets 93 secured to the top of the support 23. An adjusting screw 95 is threaded through a bushing 97 secured in the base 7, and passes through an opening 99 in the bimetallic trip element, and is adapted to limit downward movement of the leg 55 of the actuating member 51, and also to adjust the trip characteristic of each pole of the circuit breaker, as will be hereinafter described.

It will be noted that the pivot points 39 of the movable contact support 37 and the pivot points 61 for the actuating member 51 are mounted substantially in the same horizontal plane and are positioned adjacent one another. The bimetallic trip element 43 is of sufficient stiffness that in the absence of an overload such as would cause flexing of the trip element, it holds the U-shaped support 47 in fixed position, thus holding the pivot axis or point 61 for the actuating member 51 in the fixed position shown in Figs. 2 and 3 of the drawings. Under these conditions, the movement of the movable contact is controlled by the movement of the operating member 69.

The electrical connections for each pole of the breaker are identical; hence the connections for only one pole will be described. Referring to Fig. 1 of the drawings, the circuit through one pole of the breaker extends from the left-hand end terminal 9 through the bimetallic trip element 43, through a flexible shunt conductor 98, through the movable contact 41, through the stationary contact 15, through the conductor 19, to the opposite end terminal 9. When a current of predetermined magnitude flows through the circuit described above, it heats the bimetallic trip element and causes the same to flex downwardly, as shown in Fig. 4 of the drawings to effect opening of the contact means in a manner which will be hereinafter described.

It will be noted from Figs. 2 and 4 of the drawings that the operating member 71 is disconnected from the actuating members 51 when the breaker is in the closed circuit position. As shown in Figs. 2 and 4, the hook lugs 91 carried by the bar 83 of the operating member are positioned above the upper ends of the actuating members 51 so that the actuating members 51 may be moved in a clockwise direction free of the operating member 71. This results from the fact that the pivot axis 75 of the operating member 71 and the pivot axes 61 of the actuating members 51 are located at different points. This feature renders the movable contacts and actuating members trip free of the operating member, so that they may be tripped to open circuit position irrespective of the position in which the operating member is held. Thus it is impossible to hold the breaker closed against an overload or short circuit condition.

The operation of the circuit breaker will now be described. Let it be assumed that the circuit breaker is in the closed circuit position, as shown in Fig. 2, and it is desired to move the contacts thereof to the open circuit position. It will be noted in the position of the parts illustrated in Fig. 2, that the contacts are in the closed circuit

position and that the line of action of the over-center spring 63 is below the pivot axis or point 39 of the movable contact supports 37. In this position the spring biases and holds the movable contacts in engagement with their corresponding stationary contacts. If the operating handle 85 is moved from the position shown in Fig. 2 to the position shown in Fig. 3, the following actions take place. The depending lugs 89 which are longer than the lugs 91 engage the legs 53 of the actuating members 51 and rotate the same about their pivot axis or points 61 in a clockwise direction. Clockwise rotation of the actuating members 51 moves the lower ends of the over-center springs 63 in an upward direction to change their line of action. As soon as the line of action of the over-center springs 63 passes above the pivot axis or point 61, the tension of the springs continues the movement of the actuating members 51 in a clockwise direction. At this point the lugs 91 carried by the operating member have been moved down in front of the upper ends of the actuating members 51 due to the position of the pivot 75 with respect to the position of the pivot axes 61 of the actuating members. The force exerted by springs 63 now moves both the actuating members 51 and the operating member in a clockwise direction so that no further manual operating effort is required to open the breaker. As soon as the line of action of the springs passes above the pivot axes 39 of the contact supporting arms 37, the force exerted by the springs moves these arms and the movable contacts 41 carried thereby to their open circuit position with a snap action. Lugs 32 struck inwardly from the upper ends of the frame 31 limit movement of the actuating members 51 in a clockwise direction. The parts of the breaker are now in the position shown in Fig. 3, that is, the full open position. Upward movement of the movable contacts is limited by the stop brackets 93.

If it is desired to move the contacts from the position shown in Fig. 3 to the closed-circuit position shown in Fig. 2, the operating handle 85 is moved to the left, back to the position shown in Fig. 2. The hook lugs 91 engage the legs 53 of the actuating members 51 and move the same in a counter-clockwise direction about the pivot axis 61. The movement of the actuating members 51 in a counter-clockwise direction shifts the lower end of the over-center springs in a downward direction to change their line of action. As soon as the line of action of the overcenter springs 63 passes below the pivot axis or points 61, the tension of the springs acts to move the actuating members 51 in a counter-clockwise direction ahead of the operating member. The upper ends of the legs 53 of the actuating members 51 engage the lugs 89 and continue movement of the operating member 71 so that no further manual operating effort is required to close the breaker. As soon as the line of action of the springs passes below the pivot axes 39 the tension of the spring moves the contact supporting arms 37 to closed circuit position as shown in Fig. 2 with a snap action. Downward movement of the legs 55 of the actuating members 51 is limited by the adjusting screws 95.

The automatic opening of the contact means of the circuit breaker in response to overload conditions takes place in the following manner. With the circuit breaker in the closed circuit position, as shown in Fig. 2 of the drawings, if an overload of predetermined magnitude in the circuit controlled by either pole of the breaker occurs, the heat produced by the current causes flexing of the corresponding bimetallic trip element 43 in a downward direction, as shown in Fig. 4. The downward movement of the free end of the bimetallic trip element 43 moves the pivot axis or point 61 in a downward direction. In the normal or unflexed position of the bimetallic trip element, the pivot axis or point 61 of the actuating member is located above the line of action of the overcenter spring 63. As soon as the flexing of the bimetallic trip element 43 has moved the pivot axis or point 61 below the line of action of the overcenter spring 63, the tension of the spring causes clockwise rotation of the corresponding actuating member 51 and movement of the movable contact 41 to its open circuit position when movement of the actuating member 51 has carried the line of action of spring 63 above pivot point 39. As the actuating member 51 moves in a clockwise direction, the free end of the leg 55 thereof engages and moves the angle piece 87 so as to cause clockwise movement of the operating member 71 above its pivot pin 75. Movement of the operating member in a clockwise direction causes the depending lugs 89 to engage and move the leg 53 of the actuating member 51 for the opposite pole of the circuit breaker from that in which the overload occurred. Movement of the said opposite actuating member 51 in a clockwise direction shifts the line of action of the opposite overcenter spring 63 and causes opening of the contact means for said opposite pole of the breaker. It will thus be seen that an overload occurring on either pole of the breaker will cause the movable contacts of each pole to move to the open circuit position. The contact means of the pole on which the overload occurs are trip free of the operating member; that is to say, the movable contact is capable of moving to its open-circuit position in response to an overload, irrespective of the position of the control handle.

When the above-described automatic opening of the contact means in response to overload on one of the poles of the circuit breaker occurs, the contact means of the pole on which the load occurred cannot be reclosed by movement of the operating handle to the closed-circuit position without first moving the handle to the full open circuit position, because of the fact that the lowering of the axis or point 61 and the movement of the actuating member 51 causes the leg 53 to move outside of the hook lug 91, as shown in Fig. 4 of the drawings. In order to reclose the contact means of the pole on which the overload occurred, the operating handle must first be moved to the full open position shown in Fig. 3 of the drawings, during which movement the hook lug 91 rides over the leg 53 so that it is capable of reengaging the same upon movement of the operating member 71 to the closed circuit position. After the hook lug 91 is moved over the leg 53, the circuit breaker may be closed in the usual manner, as described above in connection with the manual operation of the device.

The trip characteristics of the bimetallic trip elements for the poles of the breaker may be individually adjusted by means of the adjusting screws 95. By trip characteristic is meant the value of overload current which will cause the opening of the contact means. It will readily be seen that elevation of the adjusting screw 95 will reduce the amount of downward movement or flexing of the bimetallic trip element necessary to move the pivot axis or point 61 below the

line of action of the overcenter springs 63 to cause opening of the contact means. Hence, the breaker will open more quickly in response to overloads and will also respond to lower magnitude overloads where the adjusting screw is elevated.

Electromagnetic trip devices may be substituted if desired for the bimetallic trip elements as shown schematically in Fig. 7. The supports 47' in such case would be secured to the armatures 100 of the electromagnetic trip devices. The electromagnetic coils 101 would be connected in circuit with their corresponding contact means so as to be responsive to predetermined values of overload current.

It will thus be seen that I have provided an improved form of a circuit breaker of the protective type which is simple, rugged and inexpensive to manufacture, yet it embodies the many safety features which are desirable or required for electrical devices of this nature.

While I have disclosed a specific embodiment of my invention, it is obvious that various changes may be made in the structure of the circuit breaker without departing from the spirit of the invention. I desire, therefore, that my invention be limited only by the prior art and the scope of the following claims.

I claim as my invention:

1. In a circuit breaker, contact means, means for moving said contact means to an open and to a closed circuit position with a snap action, comprising a pivoted contact actuating arm, a pivoted actuating member, an overcenter spring connecting said arm and said member, manual control means for moving said actuating member to shift the line of action of said spring relative to the pivot points of said arm and member to effect opening or closing of said contact means, and a current-responsive trip element directly supporting one of said pivot points, movable in response to predetermined conditions to move said pivot point to shift the line of action of said spring relative to said pivot points to cause opening of said contact means.

2. In a circuit breaker, a stationary and a movable contact, means for moving said movable contact to an open and to a closed circuit position with a snap action, comprising a pivoted actuating member, an overcenter spring connecting said member and said movable contact, manual control means for moving said actuating member to shift the line of action of said spring relative to the pivot point of said member to effect opening or closing of said contact means, and a current responsive trip element movable in response to predetermined conditions to shift the position of the pivot point of said member to change the line of action of said spring relative thereto to cause opening of said contact means.

3. In a circuit breaker, contact means, means for moving said contact means to an open and to a closed circuit position with a snap action, comprising a movable contact actuating arm, a pivoted actuating member, an overcenter spring connecting said arm and said member, manual control means for moving said actuating member for shifting the line of action of said spring relative to the pivot point of said member to effect opening or closing of said contact means, a thermally responsive bimetallic trip element supporting the pivot point of said member, said trip element being movable in response to predetermined conditions to shift the line of action of said spring relative to said pivot point to cause opening of said contact means.

4. In a circuit breaker, contact means, means for moving said contact means to an open and to a closed circuit position with a snap action, comprising a movable contact actuating arm, a pivoted actuating member, an overcenter spring connecting said arm and said member, manual control means for moving said actuating member to shift the line of action of said spring relative to the pivot point of said member to effect opening or closing of said contact means, and a current-responsive trip element movable in response to predetermined current conditions in the circuit controlled by the breaker for changing the position of said pivot point relative to the line of action of said spring to open said contact means.

5. In a circuit breaker, a stationary and a movable contact, means for moving said movable contact to an open and to a closed circuit position with a snap action, comprising a pivoted actuating member, an overcenter spring connecting said movable contact and said member, manual control means for moving said actuating member for shifting the line of action of said spring relative to the pivot point of said member to effect opening or closing of said contact means, and a current-responsive trip element movable in response to predetermined conditions for shifting the position of said pivot point to change the line of action of said spring relative thereto to cause opening of said contact means irrespective of the position of said manual control means.

6. In a circuit breaker, contact means, means for moving said contact means to an open and to a closed circuit position with a snap action, comprising a movable contact actuating arm, a pivoted actuating member, an overcenter spring connecting said arm and said member, manual control means for moving said actuating member to shift the line of action of said spring relative to the pivot point of said member to effect opening or closing of said contact means, current-responsive trip means supporting said pivot point and being movable in response to predetermined conditions to change the line of action of said spring relative to said pivot point to open said contact means, and means for adjusting the trip characteristic of said current-responsive trip means.

7. In a circuit breaker, contact means, means for moving said contact means to an open and to a closed circuit position with a snap action, comprising a movable contact actuating arm, a pivoted actuating member, an overcenter spring connecting said arm and said member, manual control means for moving said actuating member for shifting the line of action of said spring relative to the pivot point of said member to effect opening or closing of said contact means, and a current-responsive trip element supporting said pivot point, movable in response to predetermined conditions to shift the line of action of said spring relative to said pivot point to cause opening of said contact means, and adjusting means for defining the amount of movement of said element necessary to cause opening of said contact means.

8. In a circuit breaker, a stationary and a movable contact, means for moving said movable contact to an open and to a closed circuit position, comprising a pivoted actuating member, an overcenter spring connecting said member and said movable contact, manual control means for moving said actuating member to shift the line of

action of said spring relative to the pivot point of said member to effect opening or closing of said contact means, a thermally responsive bimetallic trip element movable in response to predetermined conditions for changing the position of said pivot point to shift the line of action of said spring relative thereto to effect opening of said contact means, and adjusting means for defining the amount of movement of said bimetallic trip element necessary to cause opening of said contact means.

9. In a circuit breaker, contact means, means for moving said contact means to an open circuit position or to a closed circuit position with a snap action, comprising a pivoted actuating member, an overcenter spring connecting said actuating member and said contact means, manual control means movable to an open or to a closed circuit position to shift the line of action of said spring relative to the pivot point of said actuating member to cause opening or closing of said contact means, and a bimetallic trip means supporting said pivot point, movable in response to predetermined conditions to change the line of action of said spring relative to said pivot point to cause opening of said contact means.

10. In a circuit breaker, contact means, means for moving said contact means to an open-circuit position or to a closed-circuit position with a snap action, comprising a pivoted actuating member, an overcenter spring connecting said member and said contact means, manual control means movable to an open or to a closed circuit position to shift the line of action of said spring relative to the pivot point of said member to cause opening or closing of said contact means, and a current-responsive trip means movable in response to predetermined conditions to shift the position of said pivot point relative to the line of action of said spring to cause opening of said contact means irrespective of the position of said manual control means.

11. In a circuit breaker, contact means, means for moving said contact means to an open-circuit position or to a closed circuit position with a snap-action, comprising a pivoted actuating member, an overcenter spring connecting said actuating member and said contact means, manual control means movable to an open or to a closed circuit position to shift the line of action of said spring relative to the pivot point of said actuating member to cause opening or closing of said contact means, and a current responsive bimetallic trip means connected in circuit with said contact means for supporting said pivot point, said trip means being movable in response to predetermined conditions to change the line of action of said spring relative to said pivot point to cause opening of said contact means, and adjusting means for defining the amount of movement of said trip element necessary to cause opening of said contact means.

12. In a circuit interrupting device, the combination of a stationary contact, a movable contact, means for moving said movable contact to an open or to a closed circuit position with a snap action comprising a pivoted contact carrying arm, a pivoted actuating member, an overcenter spring connecting said arm and said member, a manual control means for shifting the line of action of said spring relative to the pivot points of said arm and member to move said movable contact to the open or to the closed circuit position, a current responsive bimetallic trip element having a member secured thereto and projecting at an angle therefrom for supporting the pivot point of said actuating member, said trip element being adapted to be flexed in response to predetermined values of current to move said pivot point of said actuating member in such a direction as to shift the line of action of said spring relative to both pivot points with increasing acceleration to effect movement of said movable contact to the open circuit position.

13. In a circuit breaker a movable switch member, actuating means for moving the switch member to open and to closed position with a snap action including a pivoted actuating member and a trip element responsive to the current flowing in the circuit, said trip element carrying bearing means for pivotally supporting said actuating member at all times, said element being movable in response to predetermined current conditions to move the pivot of said member to cause opening movement of said switch member.

14. In a circuit breaker, a movable switch member, actuating means for moving the switch member to open and to closed position with a snap action including a pivoted actuating member, manual means for moving the actuating member to open and to close the switch member, and a trip element directly responsive to the current flowing in the circuit controlled by the breaker, said element having bearing means for pivotally supporting the actuating member and being movable in response to predetermined overload conditions to effect opening movement of the switch member.

15. In a circuit breaker, a movable switch member, actuating means therefor including an actuating member movable to open and to closed position for moving said switch member to open and to closed positions, a movable operating member having opening and closing means for engaging said actuating member to move the same to open and to closed position in response to predetermined movements of said operating member, the path of movement of said operating member being so disposed relative to the path of movement of said actuating member that said actuating member is free and clear of the closing means of the operating member in the closed circuit position of the breaker, and trip means for effecting movement of said actuating member to open circuit position in response to predetermined conditions irrespective of the position in which the operating member is held.

16. In a circuit breaker, a movable switch member, actuating means therefor including a pivoted actuating member movable to open and to closed position to move said switch member to open and to closed position, a pivoted operating member having a closing projection for engaging and moving said actuating member to closed position when the operating member is moved to closed position and an opening projection for engaging and moving said actuating member to open position when the operating member is moved to open position, the pivot axis of said operating member being so disposed relative to the pivot axis of the actuating member that the closing projection of the operating member is clear of the path of movement of the actuating member in the closed circuit position of the breaker, and trip means operable in response to predetermined conditions to effect movement of the actuating member to open circuit position.

17. In a circuit breaker, a movable switch member, actuating means therefor including a pivoted

actuating member, an overcenter spring connecting the actuating member to the switch member for moving the switch member to open and to closed position in response to predetermined movements of the actuating member, manually operable means for moving the actuating member to effect opening and closing of the switch member, trip means for supporting the actuating member movable in response to predetermined conditions to effect movement of the actuating member to open position to cause opening movement of the switch member, and means for adjusting the line of action of the spring relative to the pivot axes of the actuating member to vary the trip characteristic of the breaker.

18. In a circuit breaker, contact means, means for moving said contact means to an open circuit position or to a closed circuit position with a snap action, comprising a movable actuating member, a pivot point, a stressed member movable relative to said pivot point and connecting said actuating member and said contact means, said stressed member being movable to an open or to a closed circuit position to shift the line of action of said stressed member relative to said pivot point to cause opening or closing of said contact means, and a bimetallic trip means supporting said pivot point and movable in response to predetermined conditions to move said pivot point relative to the line of action of said stressed member to cause opening of said contact means.

19. In a circuit breaker, contact means, means for moving said contact means to an open circuit position or to a closed circuit position with a snap action, comprising a movable actuating member, a pivot point, a stressed member movable relative to said pivot point and connecting said actuating member and said contact means, said stressed member being movable by said actuating member to an open or to a closed circuit position to shift the line of action of said stressed member relative to said pivot point to cause opening or closing of said contact means, a bimetallic trip means supporting said pivot point and movable in response to predetermined conditions for providing a force to move said pivot point relative to the line of action of said stressed member upon every movement of the bimetallic means an amount which varies with the amount of movement of the bimetallic means to cause opening of said contact means.

20. In a circuit breaker, contact means, means for moving said contact means to an open circuit position or to a closed circuit position with a snap action, comprising a movable actuating member, a pivot point, a stressed member movable relative to said pivot point and connecting said actuating member and said contact means, said stressed member being movable to an open or to a closed circuit position to shift the line of action of said stressed member relative to said pivot point to cause opening or closing of said contact means, a bimetallic trip means supporting said pivot point and movable in response to predetermined conditions to move said pivot point relative to the line of action of said stressed member to cause opening of said contact means, said contact means when caused to move to open position in response to said bimetallic means remaining in open position after return of said bimetallic means to its original position, and a manually movable member operable to return said contact means to closed position.

21. In a circuit breaker, a movable contact member, actuating means for moving the contact member to open and to closed position with a snap action including an actuating member, a stressed member connected between said actuating member and said contact member, and a trip element responsive to the current flowing in the circuit, said trip element carrying bearing means for pivotally supporting a part of said actuating means at all times, said trip element being movable in response to predetermined current conditions to move the pivot of said actuating means to cause opening movement of said contact member.

22. In a circuit breaker, a movable contact member, actuating means for moving the contact member to open and to closed position with a snap action including an actuating member, a stressed member connected between said actuating member and said contact member, said stressed member when in one position holding said contact member in open position and when in another position holding said contact member in closed position, and a trip element responsive to the current flowing in the circuit, said trip element carrying bearing means for pivotally supporting a part of said actuating means at all times, said trip element being movable in response to predetermined current conditions to move the pivot of said actuating means across the line of action of said stressed member when in its position holding said contact member in closed position to cause opening movement of said contact member.

23. In a circuit breaker, a movable contact member, actuating means for moving the contact member to open and to closed position with a snap action including an actuating member, a stressed member connected between said actuating member and said contact member, and a trip element responsive to the current flowing in the circuit, said trip element carrying bearing means for pivotally supporting a part of said actuating means at all times, said trip element being movable in response to predetermined current conditions to move the pivot of said actuating means to cause opening movement of said contact member, said contact member when caused to move to open position by movement of said trip element remaining in open position even though said trip element returns to its original position, and a manually engageable member for returning said contact member to closed position, said manually engageable member being incapable of holding said contact member in closed position upon movement of said trip element to cause opening movement of said contact member.

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