

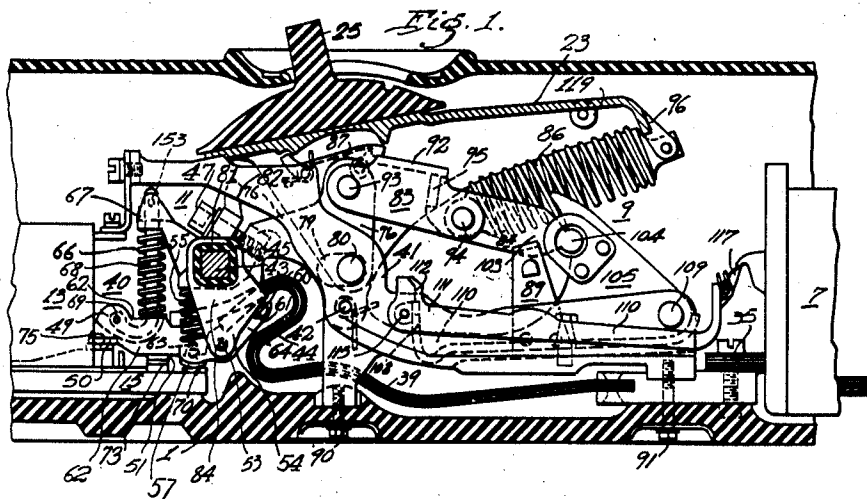
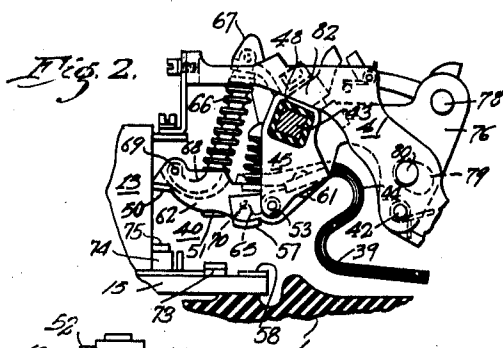
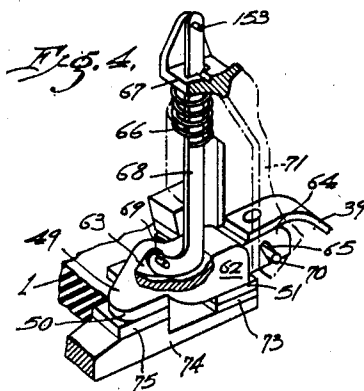
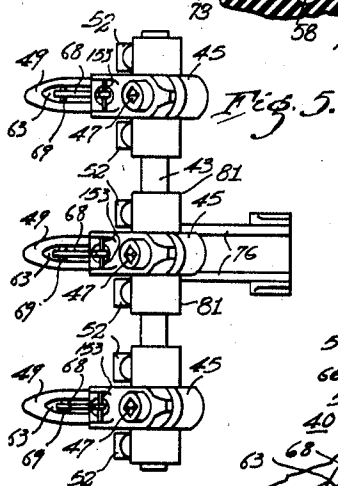
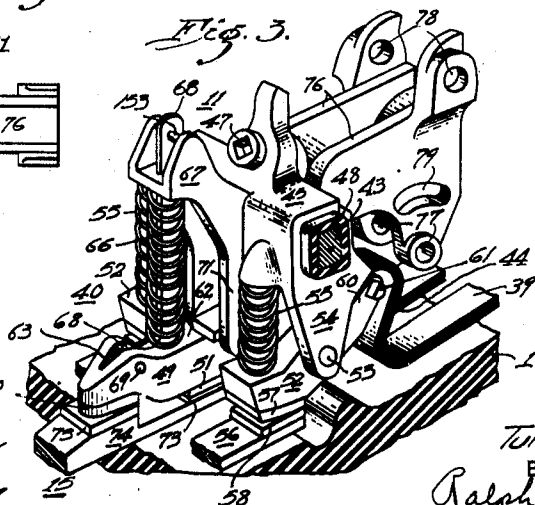
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**T. LINDSTRÖM**

**2,186,251**

# CIRCUIT BREAKER

Original Filed April 24, 1933



**WITNESSES:**

E. C. Keising  
Fred C. Wilcox

INVENTOR

*Ture Lindstrom.*

BY

BY  
Ralph H Swingle  
ATTORNEY

## UNITED STATES PATENT OFFICE

2,186,251

## CIRCUIT BREAKER

Ture Lindstrom, Edgewood, Pa., assignor to  
Westinghouse Electric & Manufacturing Com-  
pany, East Pittsburgh, Pa., a corporation of  
Pennsylvania

Original application April 24, 1933, Serial No.  
667,624. Divided and this application Novem-  
ber 4, 1936, Serial No. 109,111

## 14 Claims. (Cl. 200—87)

My invention relates particularly to circuit breakers for use in controlling lighting and distribution systems. Circuit breakers of this type are often subjected to very severe operating conditions, especially in industrial service, and at the same time the physical dimensions of the circuit breaker and its enclosure must be kept as small as possible.

This application is a division of my copending application Serial No. 667,624, filed April 24, 1933, which became Patent No. 2,083,304 on June 8, 1937, which shows and claims certain features of a circuit breaker of this type.

One object of my invention, therefore, is to provide an improved circuit breaker of this type that shall be capable of interrupting large amounts of power and that shall occupy a minimum of space.

Another object of my invention is to provide an improved circuit breaker that is manually actuable to open or close the circuit, and is automatically actuable to open the circuit and to prevent the holding of the circuit closed during the occurrence of short circuit or overload conditions.

A further object of my invention is to provide a new and improved contact assemblage for circuit breakers wherein the contact pressure is increased magnetically when the magnitude of the current flow through the contacts is increased.

A further object of my invention is to provide a contact structure which may be used in multiple circuit breakers in which the moving contact members are tied together by a bar tie and are moved to the open or closed position simultaneously by a single mechanism. The individual contact assemblages have separate independently energized magnetic means for providing contact pressure proportional to the magnitude of the current flowing in each individual pole.

A still further object of my invention is to provide an improved contact structure for use with circuit interrupters wherein the contacts open and close with a snap action, my improved structure to include main, intermediate, and arcing contacts which open in the above-mentioned order and which maintain the normal contact pressure between the engaging surfaces substantially unchanged during the opening operation.

As mentioned before, the principal field for immediate application of my invention is in connection with multi-pole circuit breakers for controlling lighting and distribution feeder circuits, and I shall hereinafter describe an embodiment of my invention as applied to such circuit breakers, without, however, in any way intending to

restrict the scope of my invention except as indicated in the appended claims.

In this embodiment of my invention, which includes many of the features disclosed in the application for Letters Patent of Harry J. Lingal, Serial No. 637,749, filed October 14, 1932, which became Patent No. 2,083,305 on June 8, 1937, and assigned to the assignee of this invention, I provide a plurality of switch members having a plurality of moving contact members resiliently mounted thereon and a plurality of cooperating stationary contact members for opening a plurality of poles. In addition, I provide a manually operable mechanism for opening and closing the circuit breaker contacts with a snap action, and a flexible shunt connected to the moving contacts for magnetically biasing them into contact making position.

The features of my invention which are believed to be new are particularly pointed out in the appended claims. For a fuller understanding of the principles of the invention, reference may be had to the accompanying drawing in which:

Figure 1 is a view, partly in section and partly in side elevation, showing the circuit breaker mechanism and the contact structure in the fully closed position.

Fig. 2 is a fragmentary view similar to Fig. 1, showing the contact structure in the open position.

Fig. 3 is a fragmentary perspective view showing the central pole contact assemblage and a portion of the tie-bar used for interconnecting the contact structures of the several poles when used in a three pole breaker.

Fig. 4 is a fragmentary perspective view showing the central unit of the contact assemblage shown in Fig. 3, and

Fig. 5 is a plan view of the three moving switch members and the cross bar which ties them together.

Referring to the drawing, the base 1 is of molded insulating material and has mounted thereon the unitary trip device 7, the circuit breaker operating mechanism 9 which has associated therewith the assemblage of switch members 11, arc extinguishers 13, and three stationary contact assemblages 15. The assemblage of switch members 11 and the stationary contact assemblages 15 combine to form the plurality of poles. The operating member 23 has a handle 25 and is rigidly pivoted at 30 onto the frame 41 of the operating mechanism 9. The unitary trip device 7 is retained in position by the screw

fastenings 35, which also serve to electrically connect the trip device with the shunts 39.

The electrical circuit for each pole may be traced from the main stationary contact assemblage 15, through the cooperating moving contact assemblage 40, the flexible conducting shunt 39 which is associated with each switch member, the terminal 35 of the unitary trip structure 7, and finally through the trip structure.

The assemblage of the switch members 11 is pivoted to the frame 41 of the operating mechanism 9 by means of a pin 42. A tie-bar 43, preferably of steel, serves to rigidly interconnect three switch members 11, the bearing for the center pole serving for all three poles when used in a three pole breaker. As shown particularly in Fig. 3, each switch member 11 includes a clamp member 45 for engaging the tie bar 43, a stud bolt 47 being provided as a fastening means. A square tube 48 of insulating material is positioned between the tie-bar 43 and the clamp members 45 to prevent the short circuiting of the several poles.

As shown particularly in Fig. 3, each of the moving contact assemblages 40 is supported upon suitable projections extending downwardly from the body of the clamp member 45. Due to the large area of the contact surfaces and the mass of the contact parts, the shunt 39 has been split into three sections and the moving contact assemblage 40 is likewise made up of three differing contact members. The centrally disposed contact member 49 includes the arcing contact 50 and the auxiliary main contact 51. The two outer contact members 52 are utilized to form the main contacts. The stationary contact assemblage 15 is provided with suitable surfaces for engaging the contact members which go to make up the moving contact assemblage 40.

The two outer contact members 52 are pivotally supported by means of pins 53 which extend through suitable openings in the projections 54 which extend downwardly from the body of the clamping member 45. Suitable springs 55 bias the contact members 52 into engagement with the cooperating sections 56 of the stationary contact assemblage 15. The engaging surfaces 57 and 58 are faced with silver in order to improve the current carrying characteristics. Each of the outer contact members 52 has a rearwardly extending portion 60 to which is fastened the shunt 39. This portion 60 has projections 61 extending outwardly therefrom. These projections are adapted to engage the downwardly extending portions 54 of the clamping member 45 in order to limit the motion of the contact member 52 about the pins 53.

The centrally disposed contact member 49 is shown particularly in Fig. 4. It includes the arcing contact 50, a body portion 62 having a slot 63 therein, the auxiliary main contact 51, and a rearwardly extending portion 64 which is brazed or otherwise conductively joined to the central portion of the shunt 39 and which includes a slot 65. The contact pressure for the arcing and auxiliary main contacts is provided by a spring 66 which is adapted to abut against the top of the body portion 62 of the central contact 49 and the projection 67 extending outwardly from the clamp member 45. An L-shaped spring guide 68 passes through a suitable opening in the projection 67 and engages the centrally disposed contact member through the agency of a pin 69 positioned within the slot 63. This L-shaped spring guide makes it possible to concentrate practically all of

the force of the spring 66 at a point near the arcing contact 50.

When the circuit breaker is in the fully closed position, the centrally disposed contact member 49 is entirely free of the clamp member 45 as shown in Fig. 4, except for the resilient connection provided by the spring 66. During the opening operation a lost motion connection between the central contact member 49 and the assemblage of switch members 11 is made possible by the slot 65 and its cooperating pin 70. This, as will be described in detail later, is a very desirable arrangement in that it assures the proper sequence of contact separation. The pin 70 is supported by the downwardly extending projections 71 of the clamp member 45.

The contact pressure securing spring 66 for the central contact member is made considerably longer than the similar springs 55 for the two outer contact members. This is done in order that the initial movement of the clamp member 45 which causes the separation of the main contacts during the first stages of the opening operation shall not result in any appreciable lessening of the normal contact pressure between the auxiliary main contacts and the arcing contacts, the initial movement being taken up by the lost motion connection so as to delay the separation of the arcing and auxiliary main contacts.

The auxiliary main contact 51 and the engaging face 73 of the cooperating portion 74 of the stationary contact assemblage 15 are made of silver in order to secure a minimum contact resistance. The arcing contact 50 and its cooperating portion 75 are made of arc resisting material, preferably a silver-tungsten alloy consisting of 40% of the former and 60% of the latter. Any conducting material capable of resisting the high temperature of the arc would be equally suitable however.

The clamp member 45 of the central switch member 11 has a bifurcated section 76 formed integral therewith. This section 76 has openings 77 (Fig. 3) for engaging the contact assemblage pivot pin 42, openings 78 for engaging the breaker operating mechanism, and slotted openings 79 for clearing the pivot pin 80 of the operating member 23.

The limit of upward motion of the assemblage of switch members 11 as they rotate about pin 42 is defined by the engagement (Fig. 2) of the portion 81 of the central clamping member 45 with the portions 82 of the U-shaped frame 41.

A reverse or S-shaped loop 44 has been placed in each of the shunts 39 to provide a simple but effective means for increasing the contact pressure between the engaging faces of the main contacts 52 and 56. The magnetic reaction of the loop is such as to push against the projection 60 of each contact member at all times with a force substantially proportional to the magnitude of the current in the shunt 39. This force biases each of the contact members 52 in a counter-clockwise direction about its pivot pin 53; or what is the same thing, biases it toward the cooperating main stationary contact 56. It is possible by this means to secure additional contact pressure in any pole of the breaker which may be carrying overload currents for short periods of time. This is a very desirable result because it reduces the size of the pressure securing springs for each of the individual contacts, and at the same time, it maintains a sufficient contact pressure to prevent undue heating regardless of the current flowing through the interrupter.

Besides this desirable characteristic of adjusting the contact pressure of the main contacts in accordance with the current flow there-through, this loop provides a biasing force which is of great assistance in securing a rapid engagement of the arcing contacts during the opening of the breaker. The arcing contact 50 is arranged to remain in contact with its cooperating contact 75 until after the main contacts and the auxiliary main contacts have separated. The contacts are separated with a snap action by the operating mechanism and it is highly desirable that some additional force be available for biasing the auxiliary contacts into engagement during the opening of the breaker. This additional force overcomes the magnetic force on the contact tending to rotate it to open position. The force for biasing the arcing contact into engagement is provided by the magnetic reaction set up in the loop 44 in the shunt 39. This method of accomplishing the desired result is particularly effective since the force is a maximum at those times when it is most needed, that is, during the occurrence of heavy overloads or short circuits, the large forces at those times helping to transfer the current from the main contacts to the auxiliary contacts with a minimum of arcing.

The arc extinguishers 13 which I prefer to use with my invention are of the spaced plate type. Patent No. 1,896,764 of M. W. Brainard, issued February 7, 1933, and assigned to the assignee of this invention, fully discloses the structural features and fully describes the operation of an arc extinguisher of this type.

The operating mechanism 9, which is more fully described in my application Serial No. 667,624, referred to above, comprises, in general, a U-shaped base or frame 41, a pair of toggle links 83 and 84 having one end connected to the assemblage of switch members 11 through the bifurcated section 76, a carrier lever 105 for releasably restraining the other end of the toggle links 83 and 84 in operative position, a channel shaped operating member 23, an over-center spring unit 86 for connecting the operating member 23 to the knee of the toggle link, the operating handle 25, and the releasable latch mechanisms 87 and 89. The U-shaped base 41 is positioned above the conducting shunt 39 and is rigidly affixed to the base 1 by means of screw fastenings 90 and 91. The screw fastenings 91 extend through one end of the shunt 39 which is positioned between the frame 41 and the base 1. As previously pointed out, the assemblage of the switch members 11 is pivoted to the frame 41 by means of the pivot pin 42, and the channel shaped operating member 23 is pivoted to the frame 41 by means of the pivot pin 80. The toggle links 83 comprises a pair of substantially parallel links which are joined by a bridge portion 92. One end of the toggle link 83 engages the bifurcated section 76 of the central clamping member 45 through the agency of the pin 93 which is journaled in the holes 78. The other end of the double toggle link 83 is pivoted to one end of the toggle link 84 by means of the knee pivot pin 94.

The toggle link 84 comprises a pair of link sections joined by a bridge portion 95 similar to the bridge portion 92 joining the link sections of the toggle 83, but disposed at the extreme end of the links beyond the pin 94. The bridge section 95 is adapted to engage the bridge portion 92 of the link 83 when the breaker is in the fully closed position (Fig. 1) and provides a stop for

defining the limit of upward motion of the knee of the toggle.

The over-center spring unit 86 operatively connects the end 96 of the operating member 23 with the knee pivot pin 94 of the toggle links and exerts a tension force therebetween.

The end 103 of each of the parallel sections of the toggle link 84 is provided with a circular bearing portion 104 (Fig. 1). Each of the bearing portions 104 engages a suitable recess in the end of one of the parallel sections of the bell crank carrier lever 105. The carrier is pivoted to the frame 41 at the apex of the bell crank lever by means of the pin 109. The arm 110 of the carrier lever 105 which does not engage the toggle link 84 extends along the base 41 to form what might be called a tail portion 108. The overcenter spring unit 86 at all times exerts a force on the carrier lever 105—transmitted through the toggle link 84—biasing that lever in a clockwise direction (Fig. 1), and it is to restrain the carrier lever 105 in an operative position that the latching lever 111 is provided.

One end of the latching lever 111 is pivoted to the base 41 by the pivot pin 115 adjacent the point of engagement with the tail piece 108 of the carrier 105. The bridge portion 112 normally overhangs the bridge portion 108 and thus holds the carrier lever in an operative position by preventing it from moving upward under the bias of the operating spring unit 86. The free end of the latching lever 111 is releasably restrained by a pivoted latch engaging mechanism 117.

My invention is not particularly concerned with the trip device 7, and any releasable restraining means capable of disengaging the latch mechanism 117 and thereby releasing the unpivoted end of the latching lever 111 in response to a predetermined electrical condition may be used. I prefer to use a trip device similar to that disclosed in the patent of Jerome Sandin, No. 2,043,306, issued June 9, 1936, and which is assigned to the assignee of this invention. This trip device has a thermally responsive and a magnetically responsive element electrically connected in each pole of the breaker. A common trip bar which is actuable by any one of the thermally responsive or magnetically responsive trip elements, engages the circuit breaker latch mechanism through suitable linkages. Upon the occurrence of an overload in any one of the poles of the breaker, the thermally responsive element acts to trip all of the poles of the breaker after a predetermined interval. Upon the occurrence of a short circuit condition in any one of the poles of the breaker, the magnetically responsive element in that pole is energized and immediately opens all the poles of the breaker. Suitable means are provided for restoring all the parts of the trip device to an operative condition following each operation—the trip device is thus completely automatically resettable.

The operating mechanism 9 of the circuit breaker is shown in closed position in Fig. 1. To open the breaker the handle 25 is rotated clockwise about its pivot 80. This carries the line of action of the spring 86 across the pivot point 104 of toggle link 84 and the toggle collapses with the knee 94 of the toggle moving toward the base and rotating the switch member 11 to open position about its pivot point 42 with a snap action.

To close the breaker, the handle 25 is rotated counter-clockwise so as to carry the line of action of the over-center spring 86 across the pivot point

104, thus returning the toggle links 83 and 84 to the straightened position shown in Fig. 1 and moving the switch member to closed position with a snap action.

Upon the occurrence of an overload, the trip device 7 releases the latch 117 on the latch arm 110 which then rotates counter-clockwise about its pivot 115 so that the catch 112 releases the tail portion 108 of the carrier 105. This permits the pivot point 104 of the toggle link 84 to rotate about the pivot point 109 of the cradle 105. This causes the toggle linkage to collapse and the switch arm to be moved to open position. The circuit breaker is reset after tripping by rotating the handle 25 clockwise until the rollers 119 engage the carrier 105 to return it and the latch arm 111 to latched position.

As mentioned previously, the main moving contacts 52 and the cooperating stationary contact members 58 are the first to separate. This results from the engagement of the projections 61 with the edges of the downwardly extending portions 54 of the clamp member 45. The springs 66 are considerably longer than the springs 55, and a movement of the switch members sufficient to cause separation of the main contacts does not result in an appreciable decrease in the contact pressure exerted by the springs 66. Thus, at the time of the separation of the main contacts, the auxiliary main contact pressure and the arcing contact pressure are substantially undiminished. As the opening operation progresses, the pin 70 (Fig. 4) moves upwardly in the slot 65 and lifts the rear end of the body portion 62 of the central contact member, thereby causing the auxiliary main contacts 51 and 73 to separate. The body portion of each of the central contact members thus begin to rotate about the arcing portion 50, the entire force of the spring 66 being still exerted substantially undiminished on the engaging surfaces of the arcing contacts. This force is further intensified due to the fact that the rotation of the body portion 62 brings its line of action almost over the engaging arcing surfaces. When the pin 153 which is affixed to the upper end of the spring guide 68 reaches the projection 67 on the central clamping member 45, further rotary movement of the central contact member is prevented. The arcing contacts then separate, and the arc is established between the surfaces 50 and 75.

It will be seen that I have disclosed a new improved circuit interrupter which possesses a number of novel and advantageous features. I have disclosed a new contact structure which is particularly suitable for use in this type of breaker and which is capable of maintaining the contact pressure at the arcing and auxiliary contacts of a circuit breaker employing a plurality of contacts which open at different times substantially constant up to the point of circuit interruption. I have also disclosed a very desirable arrangement for magnetically biasing the contacts into engagement which is particularly effective upon the flow of heavy short circuit currents.

While in accordance with the patent statutes, I have given the foregoing details of a practical embodiment of my invention, it is to be understood that many of these are merely illustrative and that variations in their precise form will be desirable in many applications. I desire, therefore, that the language of the accompanying claims be accorded the broadest reasonable construction and that my invention be limited only

by what is specifically stated in the claims and by the prior art.

I claim as my invention:

1. In a circuit interrupter, a stationary contact member, a movable switch member cooperating therewith for opening and closing the circuit, said movable switch member having a pivotally mounted contact member for engaging said stationary contact member, and magnetic means comprising a flexible conductor having an S-shaped loop therein energized at all times when said contact members are in the engaged position by the current flowing through said interrupter and applying a force to said contact member on the side of its pivot which biases said engaging contact members toward each other.

2. In a circuit interrupter, a stationary contact, a movable contact for cooperating with said stationary contact to open and close the circuit, and magnetic means comprising a double looped conductor having three portions extending generally parallel to each other and energized when said interrupter is in the fully closed position by at least a large part of the current flowing through said interrupter, said double looped conductor when energized applying a force in such direction as to bias said cooperating contacts toward each other.

3. In a circuit interrupter, a base having mounted thereon a plurality of stationary contact members and a plurality of movable switch members cooperating therewith for opening and closing a plurality of poles, said stationary contact members and said movable switch members each having engaging main and arcing contact faces, said movable switch members being rigidly tied together, an operating mechanism connected to said movable switch members for simultaneously moving all of the switch members to the open and closed positions, means biasing said engaging main and arcing contact faces toward each other with a predetermined normal force, and individual magnetic means associated with some of said movable switch members for supplying independent forces to said switch members for biasing both said engaging main contact faces and said engaging arcing contact faces toward each other, said magnetic means each comprising a flexible conductor fastened to said base for exerting said biasing force between the base and each of the movable switch members.

4. In a circuit interrupter, a plurality of stationary contact members and a plurality of movable switch members cooperating therewith for opening and closing a plurality of poles, said stationary contact members and said movable switch members each having cooperating main and arcing contact faces, some of said movable switch members being mechanically tied together by a tie bar, an operating mechanism connected to said tie bar for moving all of said mechanically tied together switch members to the open and closed positions, means for biasing said contact faces toward each other with a predetermined normal force, and individual magnetic means associated with each of some of said switch members comprising looped flexible conductors which move to straighten out when traversed by current and apply additional forces biasing said main contact faces toward each other when in closed position and also biasing said arcing contact faces toward each other during the initial opening movement of said switch members.

5. In a circuit interrupter, a single pole unit

including a movable switch member, a main contact and an arcing contact, each mounted on said switch member for movement relative thereto independently of the other, flexible conducting means connected to both of said contacts, said flexible conducting means being magnetically movable by the current flow therethrough to bias both of said contacts toward contact making position and said flexible conducting means biasing each of said contacts independently of the other.

6. In a circuit interrupter, a movable switch member, a main contact member and an auxiliary contact member each pivotally mounted on said switch member for movement relative thereto independently of the other, flexible conducting means connected at one end to each of said contact members and electrically connecting them in parallel, said flexible conducting means being magnetically movable by the current flow therethrough to bias both of said contacts toward contact making position, means for limiting the motion of each of said contact members about its pivot toward contact making position, said means permitting movement of said auxiliary contact member in contact making direction after said main contact has ceased to move about its pivot when the switch member is moved to open position whereby the circuit is finally broken by said auxiliary contact member, and said flexible conducting means biasing said auxiliary contact member in contact making direction after said movement of the main contact about its pivot has been stopped.

7. In a circuit breaker, fixed contact means, a movable switch member, a main contact member and an auxiliary contact member pivoted on said switch member in side-by-side relation, said auxiliary contact member having an auxiliary main contact surface and an arcing contact surface, spring means for biasing said contact members to move relative to said switch member in contact making direction as said switch member moves away from said fixed contact means to open circuit position, stop means for limiting the movement of said contact members in contact making direction, said stop means causing said main contact member to separate from said fixed contact means while both said main auxiliary contact surface and said arcing contact surface of the auxiliary contact member are in engagement with said fixed contact means and causing said arcing contact surface to leave said fixed contact after said auxiliary main contact surface.

8. In a circuit breaker, fixed contact means, a movable switch member, a main contact member and an auxiliary contact member pivoted on said switch member in side-by-side relation, said auxiliary contact member having an auxiliary main contact surface and an arcing contact surface, spring means for biasing said contact members to move relative to said switch member in contact making direction as said switch member moves away from said fixed contact means to open circuit position, stop means for limiting the movement of said contact members in contact making direction, said stop means causing said main contact member to separate from said fixed contact means while both said main auxiliary contact surface and said arcing contact surface of the auxiliary contact member are in engagement with said fixed contact means and causing said arcing contact surface to leave said fixed contact after said auxiliary main contact

surface and magnetic means for biasing said contact members into engagement with said fixed contact means, said magnetic means biasing said arcing contact surface into engagement with said fixed contact means even after said main contact members have separated from said fixed contact means.

9. In a circuit interrupter; a stationary contact assemblage; a movable switch member for cooperating therewith to open and to close the electric circuit through said interrupter; said switch member including a frame, at least two separate relatively movable contact members individually pivoted on said frame and electrically connected in parallel for engaging said stationary contact assemblage, and springs means for individually biasing each of said contact members toward said stationary contact assemblage; at least one of said contact members having two contact surfaces and being supported upon said frame through a lost motion connection in order that one of its two contact surfaces shall disengage said stationary contact assemblage subsequent to the other of its contact surfaces.

10. In a circuit interrupter; a stationary contact assemblage; a movable switch member for cooperating therewith to open and to close the electric circuit through said interrupter; said switch member including a frame, at least two separate relatively movable contact members, electrically connected in parallel, for engaging said stationary contact assemblage, and spring means for individually biasing each of said contact members toward said stationary contact assemblage; one of said contact members having two contact surfaces and being supported upon said frame through two lost motion connections permitting both of said contact surfaces to remain in engagement with the stationary contact assemblage after the separation of the other contact member therefrom, and said lost motion connections causing one of said contact surfaces to break engagement with the stationary contact assemblage before the other contact surface.

11. In a circuit interrupter, a stationary contact member and a movable switch member cooperating therewith for opening and closing one pole of the interrupter, said stationary contact member and said movable switch member each having cooperating main and arcing contact faces, an operating mechanism connected to move said switch member to open and closed positions, means for biasing said contact faces toward each other with a predetermined normal force, and magnetic means associated with said switch member comprising looped flexible conducting means which moves to straighten out when traversed by current and applies force biasing said main contact faces toward each other when in closed position and also biasing said arcing contact faces toward each other during the initial opening movement of said switch member.

12. In a circuit interrupter, a stationary contact member and a movable switch member cooperating therewith for opening and closing one pole of the interrupter, said stationary contact member having main and arcing contact faces and said movable switch member having pivoted thereon a contact member provided with main and arcing contact faces for cooperating with the main and arcing contact faces of the stationary contact member, an operating mechanism connected to move said switch member to open and closed positions, means for biasing said

contact faces toward each other with a predetermined normal force, and magnetic means associated with said switch member comprising looped flexible conducting means which moves to  
5 straighten out when traversed by current and applies force tending to rotate said contact member about its pivot and thereby biasing said main contact faces toward each other when in closed position and also biasing said arcing contact  
10 faces toward each other during the initial opening movement of said switch member.

13. In a circuit interrupter, a stationary contact member and a movable switch member cooperating therewith for opening and closing one  
15 pole of the interrupter, said stationary contact member and said movable switch member each having cooperating main and arcing contact faces, an operating mechanism connected to move said switch member to open and closed positions, means for biasing said contact faces toward each other with a predetermined normal  
20 force, and magnetic means associated with said switch member comprising looped flexible conducting means connected in series with both said main and arcing contact faces and which moves  
25 to straighten out when traversed by current and said looped flexible conducting means having one end fixedly supported and the other end connected to said movable switch member so that the magnetic repulsion between opposite sides of the  
30 loop applies force biasing said main contact faces toward each other when in closed position and also biasing said arcing contact faces toward

each other during the initial opening movement of said switch member.

14. In a circuit interrupter, a stationary contact member and a movable switch member cooperating therewith for opening and closing one  
5 pole of the interrupter, said stationary contact member having main and arcing contact faces and said movable switch member having pivoted thereon a contact member provided with main and arcing contact faces for cooperating with  
10 the main and arcing contact faces of the stationary contact member, an operating mechanism connected to move said switch member to open and closed positions, means for biasing said contact faces toward each other with a predetermined normal force, and magnetic means associated  
15 with said switch member comprising looped flexible conducting means connected in series with both said main and arcing contact faces and which moves to straighten out when traversed by current and said looped flexible  
20 conducting means having one end fixedly supported and the other end connected to said movable switch member so that the magnetic repulsion between opposite sides of the loop applies  
25 force tending to rotate said contact member about its pivot and thereby biasing said main contact faces toward each other when in closed position and also biasing said arcing contact faces toward each other during the initial opening  
30 movement of said switch member.

TURE LINDSTROM.