June 30, 1931. J. SACHS 1,811,970

AUTOMATIC CIRCUIT BREAKER

Original Filed June 5, 1928 4 Sheets-Sheet 1

Fig. 1

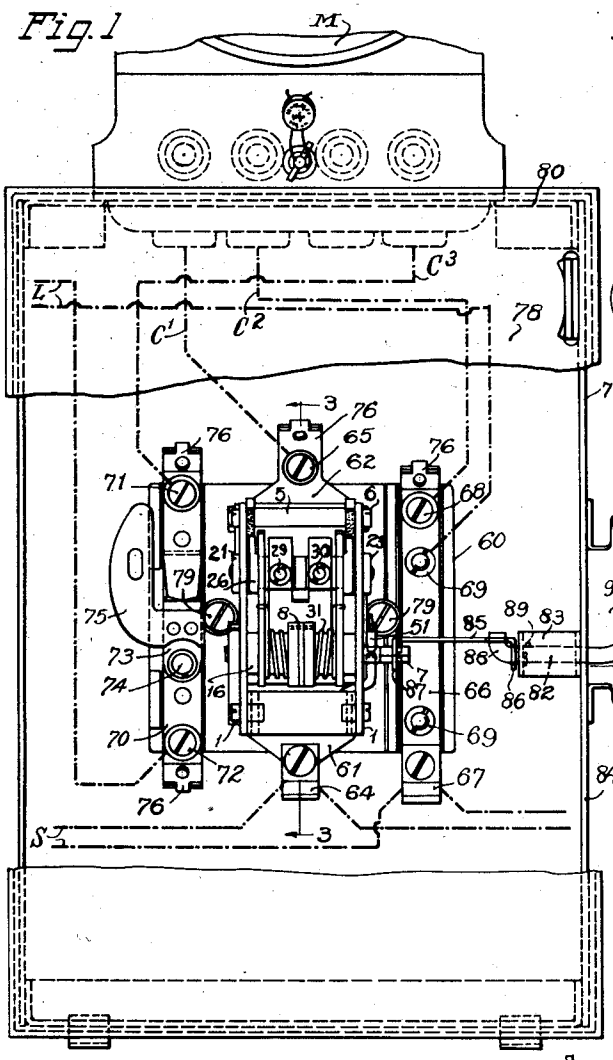



Fig. 3

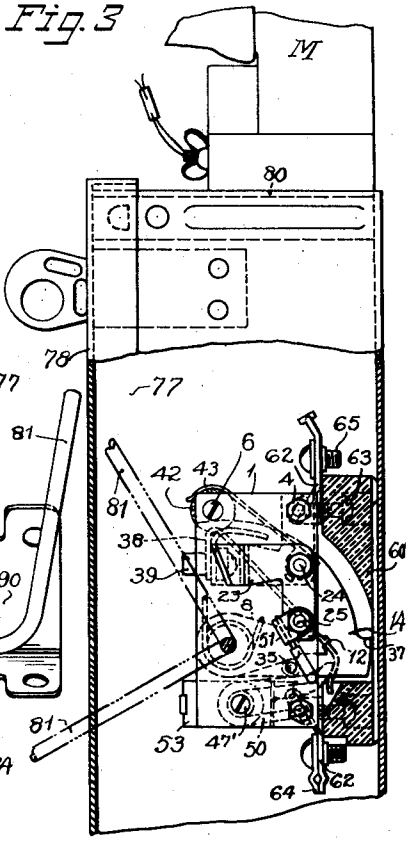
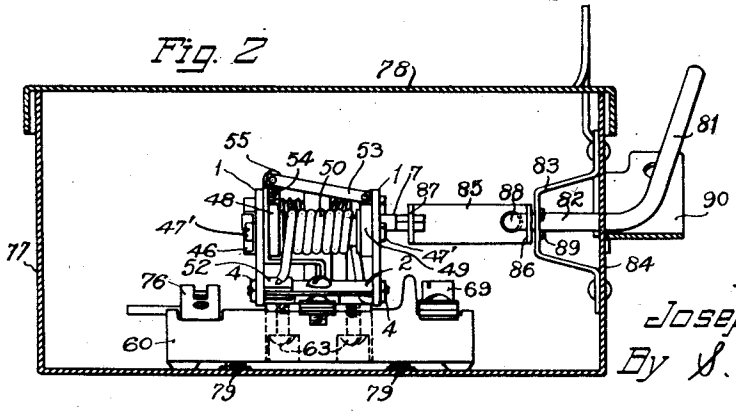



Fig. 2




Inventor
Joseph Sachs
By S. Jay Teller
Attorney

June 30, 1931. J. SACHS 1,811,970

AUTOMATIC CIRCUIT BREAKER

Original Filed June 5, 1928 4 Sheets-Sheet 2

Fig. 4

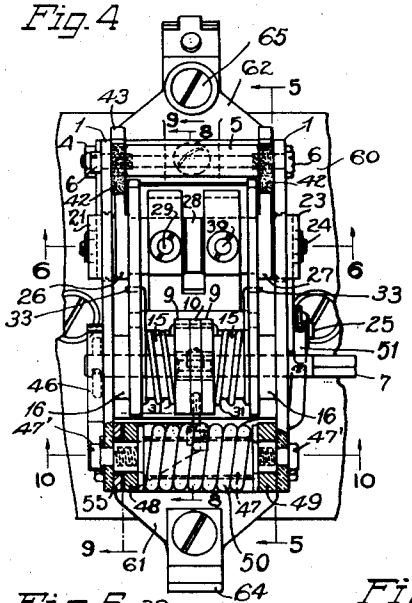


Fig. 5

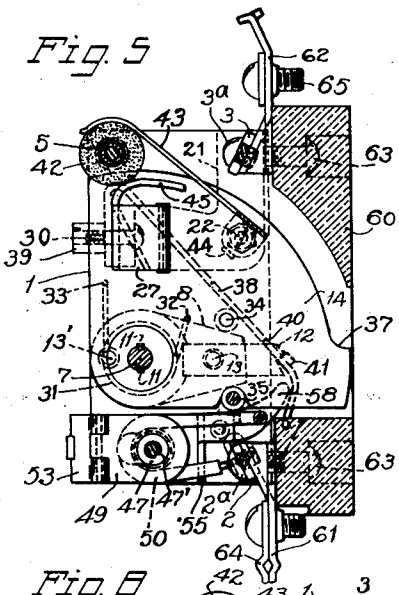


Fig. 6

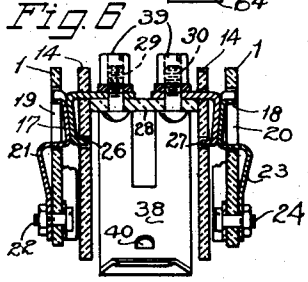


Fig. 7

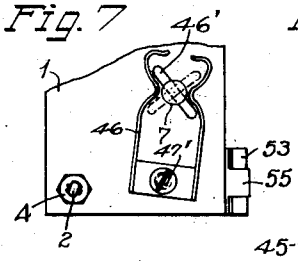


Fig. 8

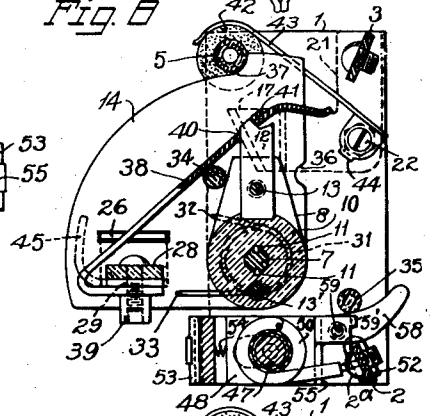


Fig. 10

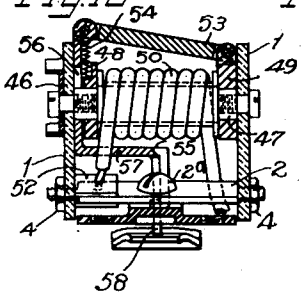


Fig. 11

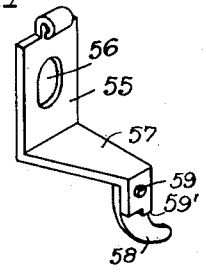
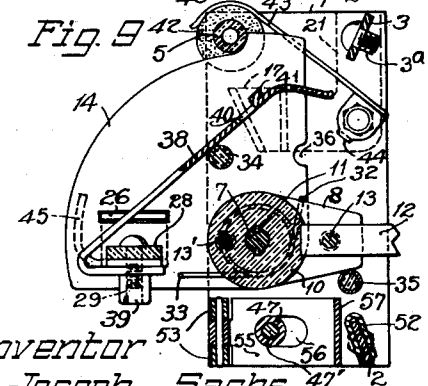


Fig. 9



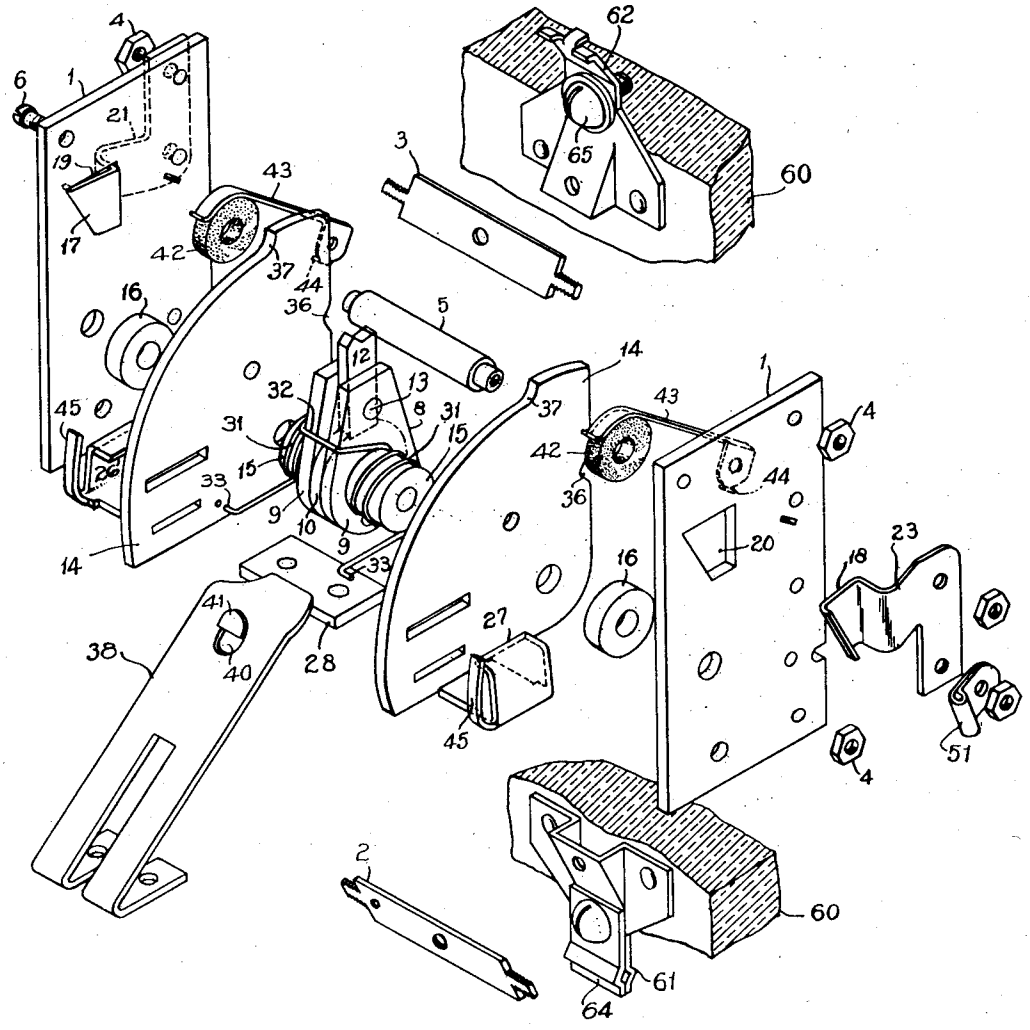
Inventor
Joseph Sachs
By S. Jay Teller
Attorney

June 30, 1931. J. SACHS 1,811,970

AUTOMATIC CIRCUIT BREAKER

Original Filed June 5, 1928 4 Sheets-Sheet 3

Fig. 11A




Inventor
Joseph Sachs
By S. Jay Teller
Attorney

June 30, 1931. J. SACHS 1,811,970

AUTOMATIC CIRCUIT BREAKER

Original Filed June 5, 1928 4 Sheets-Sheet 4

Fig. 12

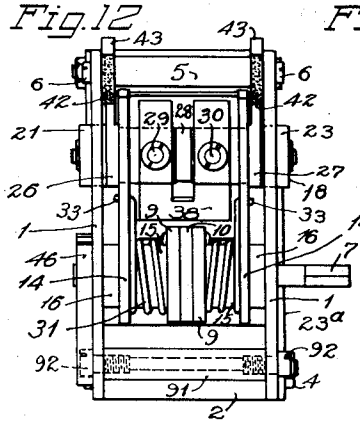


Fig. 13

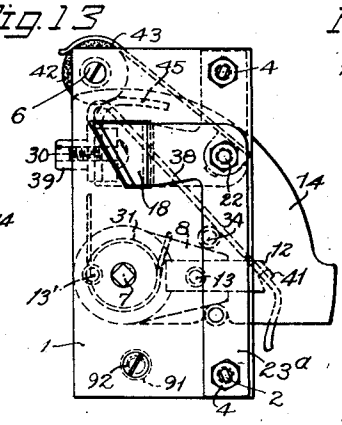


Fig. 16

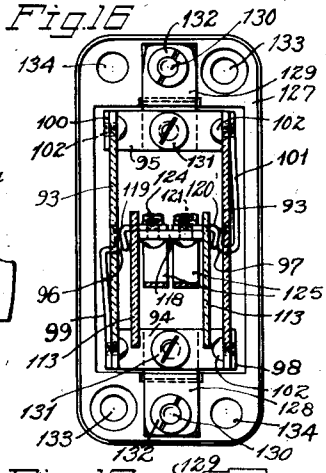


Fig. 14

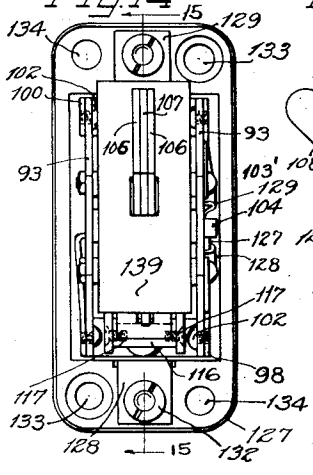


Fig. 15

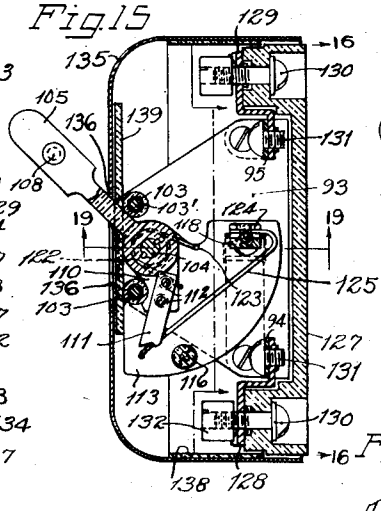


Fig. 17

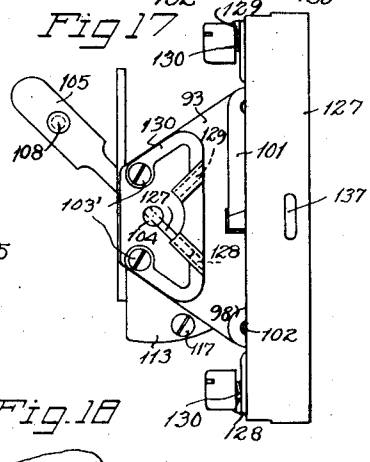


Fig. 18

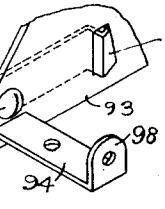


Fig. 20

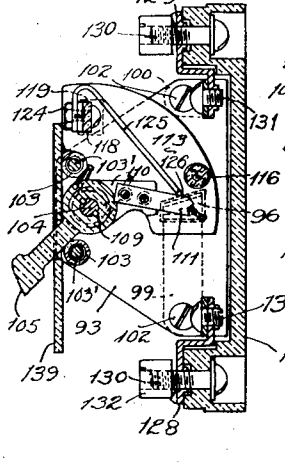


Fig. 21

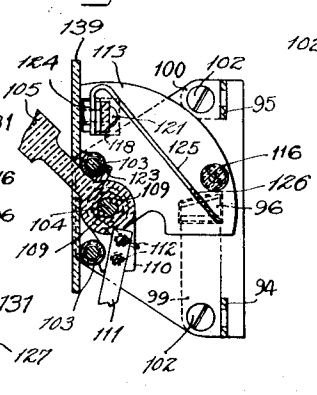
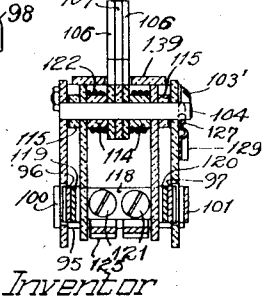


Fig. 19



Inventor
Joseph Sachs
By S. Jay Teller
Attorney

Patented June 30, 1931 1,811,970

# UNITED STATES PATENT OFFICE

JOSEPH SACHS, OF WEST HARTFORD, CONNECTICUT

## AUTOMATIC CIRCUIT BREAKER

Application filed June 5, 1928, Serial No. 283,060. Renewed September 3, 1930.

The invention relates particularly to a circuit breaker which is adapted to be small and compact and which is capable of being manufactured at low cost so as to be suitable for use with small motors and household appliances and with service entrance installations. The circuit breaker particularly when used in service entrance installations, may take the place of the usual service switch and fuses, and it affords the householder an opportunity of restoring the service himself, after it has been interrupted by an overload without the necessity for the troublesome replacement of fuses.

A circuit breaker embodying the present invention is in some respects similar to that disclosed in my copending application for Automatic circuit breaker, Serial No. 271,819, filed April 21, 1928 and is in other respects similar to that disclosed in my copending application for Automatic circuit breaker, Serial No. 279,391, filed May 21, 1928.

One of the objects of the present invention is to provide a circuit breker of the type described embodying the same general principles as disclosed in the first of the aforesaid applications, but incorporating various improved details of construction and arrangement. Particularly in accordance with the present invention I provide a circuit breaker of the type described having the operating member and the contact member thereof both mounted for pivotal movement, preferably about the same axis.

A further object of the invention is to provide a circuit breaker of the type described which includes both an electro-responsive thermal strip and a magnetically controlled device, and in which the said parts are conveniently and compactly arranged in a single easily removable unit.

A further object of the invention is to provide a circuit breaker of the type described having improved means for effecting the final breaking of the circuit and for minimizing arcing.

Still further objects of the invention will be apparent from the following specification and claims.

In the accompanying drawings I have shown three embodiments of the invention but it will be understood that the drawings are intended for illustrative purposes only and are not to be construed as limiting or defining the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawings:

Fig. 1 is a front view of a circuit breaker embodying the invention, the said circuit breaker being shown as enclosed in a cabinet adapted to be protectively associated with an electric meter.

Fig. 2 is a bottom view of the circuit breaker shown in Fig. 1, the enclosing cabinet being shown in transverse section.

Fig. 3 is a side view partly in section along the line 3—3 of Fig. 1.

Fig. 4 is an enlarged fragmentary front view showing the circuit breaker unit and a portion of the base upon which it is mounted.

Fig. 5 is a vertical sectional view taken along the line 5—5 of Fig. 4.

Fig. 6 is a horizontal sectional view taken along the line 6—6 of Fig. 4.

Fig. 7 is a fragmentary side view taken from the left and showing the spring mechanism for controlling the positions of the operating spindle and associated parts.

Fig. 8 is a vertical sectional view taken along the line 8—8 of Fig. 4 and showing the parts in the positions to which they are moved manually.

Fig. 9 is a vertical sectional view taken along the line 9—9 of Fig. 4 and showing the parts in the positions to which they are moved automatically.

Fig. 10 is a horizontal sectional view taken along the line 10—10 of Fig. 4.

Fig. 11 is a detailed perspective view of a part of the magnet mechanism.

Fig. 11A is an isometric view showing the principal parts of the circuit breaker spaced from each other so that their details of construction may more clearly appear.

Fig. 12 is a front view similar to Fig. 4 but showing an alternate embodiment of the invention.

Fig. 13 is a side view of the construction as shown in Fig. 12.

Fig. 14 is a front view of a somewhat different circuit breaker embodying the invention, the enclosing cover being omitted.

Fig. 15 is a vertical sectional view taken along the line 15—15 of Fig. 14.

Fig. 16 is a transverse vertical sectional view taken along the line 16—16 of Fig. 15.

Fig. 17 is a right side elevation.

Fig. 18 is a fragmentary perspective view showing certain details of construction.

Fig. 19 is a transverse sectional view taken along the line 19—19 of Fig. 15.

Fig. 20 is a view similar to Fig. 15 but showing the parts in the positions to which they are moved manually.

Fig. 21 is a view similar to Fig. 15 but showing the parts in the positions to which they are moved automatically.

The circuit breaker proper may if preferred constitute a separate unit adapted to be combined or associated with other electrical parts and it will be so described.

Referring particularly to Figs. 1 to 11 of the drawings, 1, 1 represent two side plates of insulated material forming parts of the body portion of the circuit breaker unit. The said body portion comprises in addition transverse metallic members 2 and 3 each of which at each end projects through a suitable opening in the corresponding side plate. As illustrated the projecting ends of the members 2 and 3 are threaded to receive nuts 4, 4 which engage the outer surfaces of the plates 1, 1. The said members 2 and 3 serve as connectors adapted to be detachably engaged with suitable companion connectors on a main supporting base or panel as will be described. The said connectors serve to effect not only mechanical but also electrical connection as will presently appear. Preferably the connectors 2 and 3 are provided with screws $2^a$ and $3^a$ and the said connectors are inclined as shown to permit more convenient access to the screws. In addition to the transverse members 2 and 3 I preferably also provide a transverse tube 5 of insulating material which extend from one side plate to the other and is suitably held in place. For holding the tube 5 I have shown screws 6, 6 which are threaded into the tube but as to this there may be wide variations.

Mounted for movement about a fixed axis extending transversely of the two side plates 1, 1 is a suitable actuating member. As shown and as now preferred the said actuating member is in the form of an arm 8 which is secured to a spindle 7 directly mounted in bearing apertures in the two side plates. As shown the right hand end of the spindle 7 is square so as to permit the engagement of a suitable operating means such as that to be described. As illustrated the arm actuator 8 comprises two plates 9, 9 shaped as shown in Fig. 5 and a central spacing washer 10. All three of these members are held in fixed relationship with the spindle by means of keys 11, 11. Positioned between the two plates 9, 9 and entering a notch in the washer 10 is a lug 12. As shown a rivet 13 extends through the two plates 9, 9 and through the lug 12 thus holding all of the parts in fixed relationship to each other. A second rivet 13′ may also be provided.

A pivoted contact member is provided, this member preferably being pivoted coaxially with the actuating member and so located as to be movable between the two side plates 1, 1. The contact member may conveniently be mounted directly upon the spindle 7 but as to this I do not narrowly limit myself. As illustrated the contact member includes two side plates 14, 14 which are mounted directly upon the spindle 7 and are free for pivotal movement independently thereof. The two side plates 14, 14 of the contact member are held in proper spaced relationship with each other and with the side plates 1, 1 of the main body portion. The said plates are so held partly by means of bushings 15, 15 surrounding the spindle and located between the side plates 14, 14 and the respective plates 9, 9 of the actuating arm. There are also provided washers 16, 16 located between the respective plates 14, 14 and the plates 1, 1 of the main body portion.

For making and breaking the circuit I provide fixed and movable electric contacts, there preferably being two fixed contacts and two movable contacts. The fixed contacts 17 and 18 are carried preferably by two side plates 1, 1 and as shown they project inward through suitable openings 19 and 20 therein. The fixed contact 17 is formed as a part of a conducting strap 21 which is held in place partly by a bolt or rivet at 22 and partly by the corresponding nut 4 at the left hand end of the connector member 3. Thus an electrical connection is established from the member 3 to the contact 17. The fixed contact 18 is formed as a part of a conducting strap 23 which is held in place by a bolt or rivet at 24. The said strap 23 is electrically connected with the connector member 2 at the lower end of the unit and in the construction shown in Figs. 1 to 11 the connection is through an electro-magnet which will be described in detail. When the connection is through the magnet the strap 23 terminates above the bottom of the unit and is held by a bolt or rivet at 25.

The aforesaid movable contacts are shown respectively at 26 and 27, and they are carried by the side plates 14, 14 of the contact member. As illustrated there is provided a bar 28 of insulating material which extends transversely between the two side plates. The two movable contacts 26 and 27 extend

through openings in the respective plates 14, 14 adjacent the said transverse bar 28. The inner end portions of the said contacts 26 and 27 are apertured to receive screws 29 and 30 which also extend through corresponding holes in the bar 28. It will be obvious that the contacts 26 and 27 are held in place, partly by the screws 29 and 30 and, partly by reason of their engagement with the edges of the said openings in the side plates. The said movable contacts 26 and 27 are positioned to be moved into or out of engagement with the said fixed contacts 17 and 18 respectively when the contact member is pivotally moved about its axis.

The two straps 21 and 23 are of resilient material so as to press the respective contacts 17 and 18 inward into firm engagement with the movable contacts 26 and 27. Preferably the said contacts 17, 18, 26 and 27 have their contact faces inclined as shown clearly in Fig. 6 so as to facilitate disengagement.

For automatically moving the contact member in the opening direction independently of the operating member I provide a suitable spring, and for this purpose I have shown a coil spring 31 which surrounds the bushings 15, 15. The central portion of the spring abuts against the arm 8 at 32 and the ends of the spring extend through holes in the plates 14, 14 as indicated at 33, 33. Thus the spring 31 tends to move the contact member in the counter-clockwise direction independently of the actuating member. For limiting the movement of the actuating member in the opposite direction with respect to the contact member I preferably provide a rod 34 which extends transversely between the two plates 14, 14 and has its reduced end portions seated in holes in the said plates. This rod 34 normally engages directly with the arm 8.

Movement of the contact member in the clockwise direction is positively limited by means of a rod 35 which extends transversely between the two main plates 1, 1 and has its reduced end portions seated in holes in the said plates. The plates 14, 14 of the contact member are provided with recesses at 36 for receiving the said rod 35. Movement of the contact member in the counter-clockwise direction is limited by the aforesaid tube 5, the said plates 14, 14 being provided with shoulders at 37 for engaging the tube.

In accordance with the invention I provide a means including an electro-responsive means normally serving to hold the operating member or spindle and the contact member in fixed relationship to each other so that they are movable in unison. The said electro-responsive device is electrically connected with the aforesaid contacts and serves upon the passage of excess current to release the movable contact member from the operating member to permit its independent movement under the action of the spring 37 for opening the circuit.

The electro-responsive means comprises an element bodily movable with the said pivoted contact and actuating members and constituting at least a part of a normally operative mechanical connection between them, the said element normally making it possible for the actuating member to effect the operation of the contact member. The said element is so constructed and so related to other parts that it is inherently responsive to abnormal current conditions in the circuit; and, by reason of an electro-responsive effect acting directly thereon, it is movable relatively to the member which supports it. This relative movement serves to render ineffective the mechanical connection between the actuating member and the contact member. The said electro-responsive movement of the said element takes place as the result of abnormal current conditions in the circuit, ordinarily excess current, and when the mechanical connection becomes ineffective the contact member is permitted to automatically move pivotally in the circuit opening direction independently of the actuating member. In the preferred form of the invention, not only one element of the electro-responsive means is bodily movable with the actuating and contact members, but the entire electro-responsive means is so movable.

The electro-responsive means may be varied as to type and as to details of construction but I prefer and have shown for this purpose an electro-responsive bi-metallic thermal strip which is adapted to be deflected by reason of the heating action of excess current therein in accordance with the well known action of such bi-metallic strips. The bi-metallic strip is shown in the drawings at 38, this strip being substantially U-shaped and having the legs of the U connected respectively with the movable contacts 26 and 27. As illustrated the end portions of the said legs are provided with holes through which the aforesaid screws 29 and 30 extend, nuts 39, 39 engaging the said screws and serving to clamp the strip 38 in place. It will be observed that the strip 38 provides an electrical connection between the two movable contacts 26 and 27, thus, when the movable and fixed contacts are in engagement, completing the circuit through the entire unit between the two connector members 2 and 3. The said strip 38 is so shaped and positioned that it serves in and of itself as a latch to hold the contact member and the actuating member in normally fixed relationship with each other. To this end the strip 38 is provided with an opening 40 adapted to receive the reduced end portion of the aforesaid lug 12. Preferably the metal which is removed to form the opening 40 is bent outward and back-

ward to form a reinforcement 41 as clearly shown in Figs. 8 and 9.

From the foregoing description and particularly by reference to Figs. 5 and 8 it will be seen that the entire assembly including the spindle 7 and the contact member with the contacts 26 and 27 and the thermal strip 38 thereon may be pivotally moved in either direction by simply turning the spindle and thus moving the actuating arm for member 8. The contact member is positively moved in the counter-clockwise direction by reason of the engagement of the arm 8 with the rod 34, and the said member is positively moved in the clockwise direction by reason of the engagement of the thermal strip 38 with the lug 12. When the parts are in the position shown in Fig. 5 the contacts 26 and 27 are in engagement with the contacts 17 and 18, a circuit being thus established which includes the bi-metallic strip 38. The circuit may be broken by moving the aforesaid assembly pivotally in the counter-clockwise direction to the position shown in Fig. 8 thus disengaging the contacts 26 and 27 from the contacts 17 and 18. It will be observed that the circuit is broken at two places thus minimizing any arcing tendency.

As already stated the normal circuit through the unit includes the bi-metallic strip 38. This strip is constructed and mounted so that upon the passage of a current therethrough in excess of a predetermined amount it will be deflected upward and rearward. The strip is so positioned and adjusted that when the current exceeds the said predetermined amount the strip will disengage the lug 12, thus breaking the mechanical connection between the contact member and the actuating member. As soon as this mechanical connection is broken the contact member is immediately turned in the counter-clockwise direction under the action of the spring 31 to the position shown in Fig. 9, the circuit being broken at two places, that is, between the contacts 17 and 26 and between the contacts 18 and 27.

After the circuit has once been automatically broken by the action of the spring 31 as already described it may be reestablished by first turning the actuating member in the counter-clockwise direction to the position shown in Fig. 8. The lug 12 will thus be engaged with the strip 38 and the parts will thus be restored to their normal relative positions. The circuit can then be closed by turning the actuating member in the clockwise direction in the normal manner. It will be clear that if the excess current condition still prevails upon attempted reclosure of the circuit the bi-metallic strip will again act as already described to cause the reopening of the circuit.

In order to reduce any arcing tendency to a minimum and to prevent any possible pitting or burning of the main contacts it may be desirable to provide current breaking contacts additional to the main contacts. The form of these supplemental contacts may be widely varied but for the purpose of illustrating the invention I have shown two rollers 42, 42, preferably of carbon, loosely mounted on the reduced end portions of the tube 5. The central openings in the rollers are preferably considerably larger than the corresponding portions of the tube in order to permit a floating action of the rollers. Associated with each of the rollers 42 and electrically connected with the corresponding fixed contact is a combined spring and conductor 43. As shown the lower end of the conductor 43 is engaged by the corresponding screw 22 or 24, electrical connection being thus established with the corresponding fixed contact. Each conductor 43 may have an extension 44 thereon projecting into a notch in the corresponding plate 1 to prevent rotative movement of the conductor about the axis of the screw. The forward upper end of the conductors 43, 43 engage the corresponding rollers 42, 42 thus forming electrical contact therewith and tending to press them forward and downward. Each of the movable contacts 26 and 27 is provided with an extension 45 which is adapted to engage the corresponding roller 42 when the contact member is moved to separate the movable contacts from the fixed contacts. The extensions 45 are of sufficient length to remain in contact with the rollers 42 until after the main contacts 26 and 27 have been completely separated from the fixed contacts 17 and 18. Thus the final breaking of the circuit occurs between the extensions 45, 45 and the carbon rollers 42, 42 and any arcing that may occur will take place between the last mentioned parts rather than between the main contacts.

In order to hold the operating member either in the circuit closing position or in the circuit opening position, that is, either in the postion shown in Fig. 5 or in the position shown in Fig. 8, I provide a suitable spring mechanism. As illustrated in Fig. 7 there is a double spring 46 suitably held in position adjacent the left hand side plate 1. The spindle 7 carries a pin 46′ which enters indentations in the spring as shown.

As already suggested it may be desirable to include in the circuit breaker unit not only an electro-responsive thermal strip such as 38 but also a magnetically controlled means for mechanically effecting the disengagement of the strip independently of the thermal action thereof. The details of construction and operation of the magnetically controlled means may be widely varied but one construction is shown and will be described in detail in order that the invention may be fully understood.

Extending transversely between the main

plates 1, 1 of the unit is a core 47 which is held in place by means of screws 47′, 47′ extending through suitable holes in the said plates. The left hand screw 47′ serves to hold the spring 46 already described. Carried by the reduced end portions of the core are cheek pieces 48 and 49. Surrounding the core 47 is a coil 50 of relatively large wire, only a few windings such as shown being required. The wire constituting the coil 50 serves as the electrical connection between the before-mentioned strap 23 and the connector member 2.

One end of the wire is connected with the strap 23 by means of a clip 51, as shown in Figs. 3 and 4, and the other end of the wire is connected directly with the connector 2. As a convenient means for establishing connection between the said wire and the connector 2 I preferably provide a clip 52 which partly surrounds the connector. The connector has a hole for receiving the end of the wire and the clip 52 has two aligned holes for receiving the end of the wire. The distance between the left hand end of the clip 52 and the two holes therein is slightly greater than the distance between the left hand end of the body portion of the connector 2 and the hole therein. The wire is entered in the holes before the nut 4 at the left hand end of the connector 2 is tightened, the clip 52 being in engagement with the corresponding plate 1 and the end of the body portion of the connector 2 being out of engagement therewith as clearly indicated in Fig. 10. Then when the nut 4 is tightened the clip 52 is caused to move slightly toward the right along the connector 2 thus applying a shearing action to the wire and establishing an excellent mechanical and electrical connection.

Pivoted to the right hand cheek piece 49 is an armature 53 which is normally held in its forward position by means of a spring 54 engaging the cheek piece 48. Pivotally connected with the armature 53 is a plate 55 which extends between the cheek piece 48 and the corresponding side plate 1. This plate 55 is shown in detail in Fig. 11. The plate 55 is slotted at 56 to receive the left hand portion of the core 47 and the lower portion 57 thereof is offset to be positioned near the center of the unit. The said offset portion 57 carries an insulating member 58 held in place by means of a screw 59. To prevent the pivotal movement of the member 58 about the axis of the screw there is provided a lug 59′ on the plate 55 projecting into an opening in the member 58. The member 58 is normally positioned in close proximity to the lower inner end of the thermal strip 38 as clearly shown in Fig. 5.

The magnetic device as described is so positioned as not to interfere in any way with the manual operation of the device as already described. Upon the passage of excess current the bi-metallic strip 31 tends to act in the way already described to effect the opening of the circuit. However, the magnet which has been described is in series with the thermal strip and is simultaneously energized tending to draw the armature 53 rearward thus moving the plate 55 rearward and causing the member 58 to strike against the thermal strip 38. The parts are so constructed and adjusted in relation to each other that a moderate overload will cause the strip 38 to deflect and thus permit the opening of the circuit as described, the magnet not being sufficiently energized to be effective. However, in the case of an excessive overload such as might be caused by a short circuit the magnet will be instantly energized, thus instantly moving the strip 38 mechanically to cause it to be disengaged from the lug 12 and thus permit the opening of the circuit. In the case of an excessive overload the magnet would act more quickly than the bi-metallic strip and thus the circuit would be interrupted more quickly than it would by means of the normal action of the said strip.

It will be observed, particularly by reference to Fig. 5, that the end of the strip 38 projects considerably beyond the point of engagement of the member 58. The purpose of this is to ensure the immediate release of the strip 38 in case an attempt is made to reclose the circuit with short circuit conditions still existing. Obviously the circuit would be completed immediately upon the initial engagement of the contacts 26 and 27 with the contacts 17 and 18 and therefore the strip 38 is made long enough to enable it to be engaged by the member 58 at the instant of this initial engagement and without waiting for complete engagement.

The circuit breaker unit which I have described may be used in association with any desired parts and I do not limit myself to any one use thereof. However, in order that one application of the invention may be clearly understood I have shown the said unit combined with other parts to form a house entrance installation adapted to be directly associated with an electric meter M. I do not herein broadly claim the use of an automatic circuit breaker mechanism as a part of a meter service installation this being set forth and claimed in my patent for Electric service installation, No. 1,696,150, dated December 18, 1928.

I have shown the circuit breaker unit as mounted on a base 60 of insulating material. The said base is provided with conducting plates 61 and 62 which are held in place on the base by means of screws 63, 63 extending forward from the rear thereof. The said plates 61 and 62 constitute connectors adapted to be engaged by the aforesaid connectors 2 and 3 of the circuit breaker unit. The circuit breaker unit proper is held in place with the

respective connectors 2 and 3 in engagement with the connectors 61 and 62. The aforesaid screws $2^a$ and $3^a$ extend into threaded holes in the said plates 61 and 62. Portions of the connector plates 61 and 62 are bent outward as shown to conform to the inclination of the connector members 2 and 3. The said plates 61 and 62 are further provided with means such as the clamp 64 and the screw 65 for engagement with electric conductor wires. In order that complete provision may be made for the connection and use of an electric meter I provide on the base 60 in addition to the circuit breaker unit a neutral conductor or strap 66 provided with wire terminals 67 and 68 and additional terminals 69, 69, and I also provide a test switch 70 interposed between wire terminals 71 and 72. The details of the test switch 70 may be varied but I have shown a switch comprising a blade 73 pivoted at 74 and adapted to be swung laterally by means of an insulating handle 75. In order to further facilitate the testing of the meter suitable contacts adapted for the attachment of instrument leads and by-pass connections are provided at 76, 76.

One arrangement of electrical connection which may be used is shown by dot-and-dash lines in Fig. 1. The service wires S are connected respectively with the terminals 64 and 67. Meter connections $C^1$ and $C^2$ extend respectively from the terminals 65 and 68 to the meter and another meter connection $C^3$ extends from the meter to the terminal 71. The load wires L are connected with one of the terminals 69 and with the terminal 72.

From the foregoing description it will be apparent that the circuit breaker unit is interposed between an incoming service wire and the meter and thus serves to protect not only the customer's load circuit but also the meter in case of any excess current conditions. The circuit from the meter extends through the test switch 70 and this switch may therefore be utilized to disconnect the meter from the load wires for testing in accordance with well understood practice. Prior to the opening of the switch 70 a suitable by-pass may be connected to the proper contacts 76, 76 in order that the customer's circuit may not be interrupted.

The base 60 and the parts carried thereby may be enclosed in a protecting cabinet such as the cabinet 77. This cabinet is or may be of substantially standard construction being rectangular in form and having an openable front cover 78 adapted to be sealed in closed position to protect the interior parts. The base 60 may be secured to the rear wall of the cabinet by means of screws 79, 79. Preferably the upper end wall 80 of the cabinet is provided with a suitable opening through which the terminal chamber portion of the meter M may project as shown so as to entirely enclose the connections between the meter and the service appliance within the cabinet.

A suitable means is provided for manually operating the actuating member of the circuit breaker unit and I preferably provide an operating handle which is mounted independently of the circuit breaker unit and which is detachably connectible therewith. The details of the construction and independent mounting of the operating means or handle may be varied but as shown I provide a handle 81 which is on the exterior of the cabinet and which is connected with a spindle 82 extending through one side wall of the cabinet into the interior thereof. As shown a bearing bracket 83 is riveted or otherwise secured to the right hand side wall 84 of the cabinet and the said bracket and the said side wall are formed with aligned bearing apertures for the spindle 82. Connected with the spindle 82 at the inner end thereof is a yoke 85 having two angular flanges 86 and 87. The spindle extends through a hole in the flange 86 and the inner end of the spindle is bent at 88 to project through a hole in the body of the yoke. Thus the yoke 85 is detachably connected with the spindle 82 for rotative movement therewith. The other flange 87 is provided with a square hole to receive the square end of the main actuating spindle 7. Longitudinal movement of the spindle in the inward direction is limited by means of a cotter pin 89. Carried by the side wall 84 is a stop 90 for limiting the movement of the handle 81.

As already stated the circuit breaker unit is detachably mounted on the base being held in place by means of the screws $2^a$ and $3^a$. The spindle 7 is detachably engaged with the yoke 85 forming a part of the manual operating means. It is therefore obvious that the entire circuit breaker unit can be easily removed for inspection, repair or replacement without disturbing any of the wiring connections or any of the other parts of the installation.

From the foregoing description it will be apparent that the handle 81 is accessible when the cover 78 is closed to render the parts inside of the cabinet entirely inaccessible. By turning the handle 81 the customer can operate the circuit breaker as before described to open or close the circuit any time as desired. However, the circuit breaker construction is such that the operator cannot interfere with the automatic opening thereof, the said automatic opening taking place independently of the handle 81.

In Figs. 12 and 13 I have shown a circuit breaker unit which is substantially identical in construction throughout with the unit shown in Figs. 1 to 11 with the single exception that the magnetically controlled device is omitted. In view of the similarity of construction repetition of the detailed descrip-

tion will be unnecessary. From an inspection of the drawings it will be observed that the magnet and associated parts are omitted and that the strap 23ª at the right hand side is extended to the bottom of the unit so as to be directly engaged by the nut 4 at the right hand end of the transverse connector member 2. Thus an electrical connection is established directly between the said connector member 2 and the fixed contact 18. If desired in order to strengthen the construction there may be provided an additional tie member between the side plates 1, 1 this being in the form of a tube 91 held in place by means of screws 92, 92. If desired the screws 92, 92 may extend through the same holes which with the construction shown in the other figures serve to receive the screws 47, 47'.

In Figs. 14 to 21 I have shown another embodiment of the invention, the construction being similar in principle to that shown in Figs. 12 and 13 but differing in structural details.

There are two side plates 93, 93 of insulating material forming parts of the body portion of the circuit breaker unit. Two transverse metallic members 94 and 95, are provided and as illustrated these are formed integrally with the respective fixed contacts 96 and 97. Each of the side plates 93 is slotted at each end, as illustrated for instance in Fig. 18, to receive the corresponding transverse member 94 or 95. Referring particularly to the cross member 94 as shown in Fig. 18, it will be observed that this member is provided with an integral ear 98 at the right hand end and with an integral extension 99 at the left hand end. This extension is positioned along the outer side of the left hand plate 93 and terminates in the said terminal 96 which projects through a suitable hole in the plate. Similarly the transverse member 95 is provided with an ear 100 and an extension 101 which terminates in the aforesaid terminal 97. The said ears and extensions on the transverse members 94 or 95 are secured to the respective plates by means of rivets or screws 102, 102. The two plates 93, 93 are further connected by means of transverse tubes 103, 103 of insulating material, tie bolts 103', 103' extending through these tubes to hold the parts in place.

Mounted in suitable bearing apertures in the two plates 93, 93 is a spindle 104 to which is secured a combined handle and actuating arm or member. As illustrated there is a handle 105 comprising three plates 106, 106 and 107 connected together by means of a rivet 108. The three plates constituting the handle are secured to the spindle 104 by means of keys 109. The two outer plates 106, 106 are extended to form an arm 110, a lug 111 being secured between the extensions of these two plates by means of rivets 112.

Loosely mounted on the spindle 104 are two side plates 113, 113 constituting the body portion of the contact member. The two plates 113, 113 are held in properly spaced relationship with each other and with the main side plates 93, 93 by means of bushings 114, 114 and washers 115, 115. The two plates 113, 113 are connected by means of a transverse insulating rod 116 which is held in place by means of screws 117 at the ends thereof. A bar 118 of insulating material also extends transversely between the two side plates 113, 113. The two movable contacts 119 and 120 extend through recesses in the respective plates 113, 113 adjacent the said transverse bar 118. The inner end portions of the said contacts 119, 120 are apertured to receive screws 121, 121 which also extend through corresponding holes in the bar 118. The said movable contacts are positioned to be moved into or out of engagement with the fixed contacts 96 and 97. The extensions 99 and 101 which support the contacts 96 and 97 are resilient and serve to press the respective fixed contacts into firm engagement with the said movable contacts.

For automatically moving the contact member in the opening or counter-clockwise direction independently of the handle 105 I provide a coil spring 122 which surrounds the bushings 114, 114. The central portion of the spring abuts against the arm 110 and the ends of the spring extend through holes in the plates 93, 93 as indicated at 123. The aforesaid transverse tubes 103, 103 serve to limit the movement of the contact member in both directions, the said plates 113, 113 of the contact member being notched as shown to receive the said tubes, and also serve to limit the movement of the handle 105 in both directions.

Carried by the contact member is a bimetallic thermal strip 125 similar in construction and similar in purpose to the thermal strip 38 described in connection with Figs. 1 to 11. This strip is held in place by means of nuts 124, 124 on the screws 121, 121 and is provided with a hole 126 to receive the reduced end portion of the lug 111. This thermal strip in and of itself serves as a latch to hold the contact member in normally fixed relation to the handle 105 and the arm 110.

The spindle 104 carries at one end a radially projecting pin 127 which is adapted to be engaged in either one of the two notches 128 and 129 in a spring member 130 secured to one side of the device. As shown the spring member 130 is held in place by means of the heads of the screws 103', 103'.

It will be understood that the entire assembly comprising the handle 105, the arm 110 and the contact member with the movable contacts and the thermal strip thereon can be moved pivotally in either direction to open and close the circuit. Fig. 15 shows

the parts in the normal circuit closing position and Fig. 20 shows them in the circuit opening position. When excess current flows through the device the thermal strip 125 is deflected in the manner already described and is automatically disengaged from the lug 111. This permits the contact member to move in the counter-clockwise direction under the influence of the spring 122 to the position shown in Fig. 21. After the circuit has once been automatically broken by the action of the spring as described it may be re-established by first turning the handle in the counter-clockwise direction to the position shown in Fig. 20. The lug 111 will thus be engaged with the strip 125 and the parts will thus be restored to their normal relative positions. The circuit can thus be closed by turning the handle in the clockwise direction in the normal manner.

As already implied the two side plates 93, 93 with the parts carried thereby and immediately associated therewith constitute a circuit breaker unit. This unit may be variously mounted but as illustrated I have shown it mounted on a base 127 of insulating material. The base is provided at opposite ends with conductor plates 128 and 129 held in place by means of screws 130, 130. These plates are provided with extensions adapted to serve as connectors for engagement with the transverse connector members 94 and 95 of the unit. The unit may be held in place by means of screws 131, 131 extending through suitable holes in the respective connectors. The two screws 130, 130 may be extended forward and provided with nuts 132, 132 adapted for the holding of conductor wires. As shown the base is provided with two countersunk holes 133, 133 adapted for receiving screws to hold the base in place on a panel board or other suitable support, and the base is further provided with holes 134, 134 adapted to permit the passage of conductor wires extending to the terminal nuts 132, 132.

The entire structure as described may be enclosed in a cover 135 provided with a slot 136 at the front to permit the handle 105 to extend therethrough. The cover 135 is provided with inward projections (not shown) adapted to extend into recesses 137 in the base 130. The cover is sufficiently resilient to permit it to be removed or snapped in place as desired. The cover is provided with a partial lining 138 of insulating material.

Preferably in order that the slot 136 may not be entirely open I provide a slide 139 having a relatively small opening through which the handle 105 projects. The slide 139 is guided between the two side plates 93, 93 and is further guided between the two tubes 103, 103 and the front wall of the cover. It will be understood that the slide 139 moves vertically when the handle 105 is moved and serves to close the slot 136.

What I claim is:

1. In an automatic circuit breaker, the combination of a pivotally movable contact member biased toward its open-circuit position, an actuating member also pivotally movable and normally adapted to move the contact member to open or close the circuit, and an electro-responsive means comprising an element inherently responsive to abnormal current conditions in the circuit and constituting at least a part of a movable mechanical connection between the aforesaid members normally operative to prevent independent pivotal circuit opening movement of the contact member, the said element upon the attainment of an abnormal current condition in the circuit and by reason of its own inherent electro-responsive characteristics being movable relatively to the aforesaid members so as to render the said mechanical connection ineffective and to thereby permit the contact member to pivotally move to its open-circuit position independently of the actuating member.

2. In an automatic circuit breaker, the combination as set forth in claim 1, wherein the electro-responsively movable element is a latch carried by one of the said members and normally having a direct engagement with the other, the said latch being automatically disengaged from the said other member upon the attainment of an abnormal circuit condition so as to permit independent pivotal movement of the contact member.

3. In an automatic circuit breaker, the combination as set forth in claim 1, wherein the entire electro-responsive means is bodily movable with the said pivoted actuating and contact members.

4. In an automatic circuit breaker, the combination of a pivotally movable contact member biased toward its open-circuit position, an actuating member pivotally movable coaxially with the contact member and normally adapted to move it to open or close the circuit, and an electro-responsive means comprising a thermally-responsive element normally movable with the aforesaid members and constituting at least a part of a movable mechanical connection between them normally operative to prevent independent pivotal circuit opening movement of the contact member, the said element upon the attainment of an abnormal current condition in the circuit and as the result of its own thermally-responsive characteristics being movable relatively to the said members so as to render the said mechanical connection ineffective and to thereby permit the contact member to pivotally move to its open-circuit position independently of the actuating member.

5. In an automatic circuit breaker, the com-

bination as set forth in claim 4, wherein the thermally-responsive element is a latch carried by one of the said members and normally having a direct engagement with the other, the said latch being automatically disengaged from the said other element upon the attainment of an abnormal current condition.

6. In an automatic circuit breaker, the combination of a pivotally movable actuating member, a contact member pivotally movable coaxially with the actuating member and biased independently thereof toward its open-circuit position, and an electrothermally affected element serving in and of itself as a releasable latch normally movable with the actuating and contact members and normally operated for mechanically connecting them to enable the former to effect the pivotal movement of the latter to open or close the circuit, the said electrothermally affected latch being connected in the circuit so as to be automatically actuated upon the passage of excess current therethrough to mechanically disconnect the contact member from the actuating member and thus permit the said contact member to automatically move pivotally to its open-circuit position independently of the actuating member.

7. In an automatic circuit breaker, the combination of a pivotally movable contact member biased toward its open-circuit position, an actuating member pivotally movable coaxially with the contact member and normally adapted to move it to open or close the circuit, and a thermostatic bi-metallic strip serving in and of itself as a releasable latch normally movable with the actuating and contact members and normally operative for mechanically connecting them to enable the former to effect the pivotal movement of the latter, the said thermostatic bi-metallic latch being connected in the circuit so as to be automatically deflected from its normal position upon the attainment of an abnormal current condition therein and to thus mechanically disconnect the contact member from the actuating member and to permit the said contact member to automatically move pivotally to its open-circuit position independently of the actuating member.

8. In an automatic circuit breaker, the combination as set forth in claim 7, wherein the thermostatic bi-metallic latch is so related to the actuating and contact members that it acts by tension to pivotally move the contact member to closed-circuit position and to normally hold it in such position.

9. In an automatic circuit breaker, the combination of a pivotally movable actuating member, a contact member pivotally movable coaxially with the actuating member and biased independently thereof toward its open-circuit position, two contacts on the contact member, two stationary contacts with which the movable contacts are normally engaged, and a bi-metallic strip serving in and of itself as a releasable latch normally movable with the actuating and contact members and normally operative for mechanically connecting them to enable the former to effect the pivotal movement of the latter to bring the movable contacts out of or into engagement with the respective stationary contacts and thereby open or close the circuit at two separate places, the said bi-metallic latch being carried by the contact member so as to be movable therewith independently of the actuating member and being electrically connected in the circuit between the two movable contacts so as to be automatically deflected upon the passage of excess current therethrough to mechanically disconnect the contact member from the actuating member and thus permit the said contact member to automatically move pivotally to its open-circuit position independently of the actuating member.

10. In an automatic circuit breaker, the combination as set forth in claim 9, wherein the thermostatic bi-metallic strip is U-shaped and wherein the end portions of the strip are detachably held in electrical connection with the respective movable contacts.

11. In an automatic circuit breaker, the combination of a pivotally movable actuating member, a pivotally movable contact member, a spring operatively interposed between the actuating member and the contact member and tending to move the latter relatively to the former toward its open-circuit position, and means pivotally movable with the said actuating and contact members and providing a normally operative releasable mechanical connection between them enabling the former to effect the movement of the latter to open or close the circuit, the said connection means including an electro-responsive device electrically connected in the circuit so as to automatically serve upon the passage of excess current to release the contact member from the actuating member and thus permit the said contact member to automatically move pivotally under the action of the spring to its open-circuit position independently of the actuating member.

12. An automatic circuit breaker comprising in combination, a pivotally movable actuating member, a contact member pivoted for movement coaxially with the actuating member and comprising two spaced plates at opposite sides of the actuating member, the said contact member being biased for movement relatively to the actuating member toward its open-circuit position, two stationary electric contacts, two movable electric contacts carried by the contact member and movable therewith into and out of engagement with the respective stationary contacts

so as to close and open the circuit at two places, and an electro-responsively releasable means positioned between the two plates of the contact member and constituting a mechanical connection between the said actuating and contact members normally operative to prevent independent circuit opening movement of the latter, the last said means upon the attainment of abnormal current conditions in the circuit becoming mechanically ineffective so as to permit the contact member to pivotally move to its circuit opening position independently of the actuating member.

13. An automatic circuit breaker comprising in combination, a pivotally movable actuating member, a contact member pivoted for movement coaxially with the actuating member and comprising two spaced plates at opposite sides of the actuating member, the said contact member being biased for movement relatively to the actuating member toward its open-circuit position, two stationary electric contacts, two movable electric contacts carried by the contact member and movable therewith into and out of engagement with the respective stationary contacts so as to close and open the circuit at two places, and a bi-metallic thermal strip positioned between the two plates of the contact member and electrically connected between the two movable contacts, the said strip normally serving as a latch to mechanically connect the said contact member with the said actuating member to enable the latter to operate the former and the said strip also serving upon the passage therethrough of excess current to automatically release the contact member to permit automatic movement thereoef to its open circuit position independently of the actuating member.

14. An automatic circuit breaker as set forth in claim 13, wherein there is a transverse member extending between the two side plates of the contact member and adapted to engage the actuating member to limit relative movement between the two members.

15. In an automatic circuit breaker, the combination of a main body, a manually operable transverse spindle rotatably mounted on the body, an actuating arm fixed to the spindle, a contact member comprising two spaced plates pivoted on the spindle at opposite sides of the arm, twc fixed electric contacts on the main body, two movable electric contacts carried by the contact member and movable therewith into and out of engagement with the respective fixed contacts, a spring for moving the contact member relatively to the spindle and arm in the direction to separate the movable contacts from the fixed contacts, and a bi-metallic thermal strip carried by the contact members between the two plates thereof and electrically connected in series between the two movable contacts, the said strip serving as a latch to mechanically connect the said contact member with the said arm and upon the passage therethrough of excess current being automatically releasable to permit movement of the contact member by the spring.

16. An automatic circuit breaker comprising in combination, a pivotally movable actuating member, a contact member pivoted for movement coaxially with the actuating member and comprising two spaced insulating plates at opposite sides of the actuating member, the said contact member being biased for movement relatively to the actuating member toward its open-circuit position, two stationary electric contacts, two movable electric contacts carried directly by the respective insulating side plates of the contact member, the said contacts being movable with the contact member into and out of engagement with the respective stationary contacts so as to close and open the circuit at two places, and an electro-responsively releasable means positioned between the two plates of the contact member and constituting a mechanical connection between the said actuating and contact members normally operative to prevent independent circuit opening movement of the latter, the last said means being electrically connected between the said movable contacts and upon the attainment of abnormal current conditions in the circuit becoming mechanically ineffective so as to permit the contact member to pivotally move to its circuit opening position independently of the actuating member.

17. An automatic circuit breaker comprising in combination, a pivotally movable actuating member, a contact member pivoted for movement coaxially with the actuating member and comprising two spaced insulating plates at opposite sides of the actuating member, the said contact member being biased for movement relatively to the actuating member toward its open-circuit position, two stationary electric contacts, two movable electric contacts carried directly by the respective insulating side plates of the contact member, the said contacts being movable with the contact member into and out of engagement with the respective stationary contacts so as to close and open the circuit at two places, and a U-shaped bi-metallic thermal strip carried by the contact member between the two plates thereof and having its ends electrically connected with the respective movable contacts, the said strip normally serving as a latch to mechanically connect the said contact member with the said actuating member to enable the latter to operate the former and the said strip also serving upon the passage therethrough of excess current to automatically release the contact member to permit automatic movement thereof to its open-cir-

cuit position independently of the actuating member.

18. An automatic circuit breaker as set forth in claim 17, wherein the side plates of the contact member are provided with openings and wherein the contacts project through the openings.

19. An automatic circuit breaker comprising in combination, a pivotally movable actuating member, a contact member pivoted for movement coaxially with the actuating member and comprising two spaced insulating plates at opposite sides of the actuating member and an insulating bar extending transversely between the two side plates, the said contact member being biased for movement relatively to the actuating member toward its open-circuit position, two stationary electric contacts, two movable electric contacts carried directly by the respective side plates of the contact member and having portions thereof engaging and connected with the said insulating cross bar, the said contacts being movable with the contact member into and out of engagement with the respective stationary contacts so as to close and open the circuit at two places, and a U-shaped bi-metallic thermal strip carried by the contact member between the two plates thereof and having its ends electrically connected with the respective movable contacts, the said strip normally serving as a latch to mechanically connect the said contact member with the said actuating member to enable the latter to operate the former and the said strip also serving upon the passage therethrough of excess current to automatically release the contact member to permit automatic movement thereof to its open-circuit position independently of the actuating member.

20. An automatic circuit breaker as set forth in claim 19, wherein the side plates of the contact member are provided with openings and wherein the contacts project through the openings and are partly held in place by reason of their engagement with the edges of the openings.

21. An automatic circuit breaker as set forth in claim 19, wherein the contacts are connected with the transverse insulating bar by means of screws and wherein the ends of the thermal strip are in direct engagement with the movable contacts and are detachably held in place by the said screws.

22. An automatic circuit breaker comprising in combination, a body having two parallel spaced side plates, an actuating member located between the side plates of the body and pivotally movable about a fixed axis perpendicular to the said plates, a contact member located between the said side plates and pivoted for movement coaxially with the actuating member, the said contact member being biased for movement relatively to the actuating member toward its open-circuit position, a stationary electric contact carried by the body, a movable electric contact carried by the contact member and movable therewith into and out of engagement with the stationary contact so as to close and open the circuit, and a bi-metallic thermal strip carried by the contact member and electrically connected with the movable contact, the said strip normally serving as a latch to mechanically connect the said contact member with the said actuating member to enable the latter to operate the former and the said strip also serving upon the passage therethrough of excess current to automatically release the contact member to permit automatic movement thereof to its open-circuit position independently of the actuating member.

23. An automatic circuit breaker unit comprising in combination, a body having two parallel spaced insulating side plates and two transverse conducting members mechanically connecting the side plates, an actuating member located between the side plates of the body and pivotally movable about a fixed axis perpendicular to the said plates, a contact member located between the said side plates and pivoted for movement coaxially with the actuating member, the said contact member being biased for movement relatively to the actuating member toward its open-circuit position, two stationary electric contacts carried by the respective side plates of the body and electrically connected respectively with the two transverse conducting members, two movable electric contacts carried by the contact member and movable therewith into and out of engagement with the respective stationary contacts so as to close and open the circuit at two places, and a bi-metallic thermal strip carried by the contact member and electrically connected between the two movable contacts, the said strip normally serving as a latch to mechanically connect the said contact member with the said actuating member to enable the latter to operate the former and the said strip also serving upon the passage therethrough of excess current to automatically release the contact member to permit automatic movement thereof to its open-circuit position independently of the actuating member.

24. An automatic circuit breaker as set forth in claim 22, wherein the contact member comprises two spaced plates at opposite sides of the actuating member.

25. In an automatic circuit breaker, the combination of a main body comprising two spaced plates, a spindle extending transversely between the plates and rotatably mounted in bearing apertures, therein, an actuating arm fixed to the spindle, a contact member comprising two spaced plates pivoted on the spindle at opposite sides of the arm and between the first said plates, two

fixed electric contacts on the main body, two movable electric contacts carried by the contact member and movable therewith into and out of engagement with the respective fixed contacts, a spring for moving the contact member relatively to the spindle and arm in the direction to separate the movable contacts from the fixed contacts, and a bi-metallic thermal strip carried by the contact member between the two plates thereof and electrically connected in series between the two movable contacts, the said strip serving as a latch to mechanically connect the said contact member with the said arm and upon the passage therethrough of excess current being automatically releasable to permit movement of the contact member by the spring.

26. An automatic circuit breaker comprising in combination, a contact member pivoted for movement about a fixed axis, an actuating member pivoted coaxially with the contact member, a fixed electric contact, a movable electric contact on the contact member movable into or out of engagement with the fixed contact, a spring tending to move the contact member relatively to the actuating member so as to move the movable contact out of engagement with the fixed contact, means including an electro-responsive device bodily movable with the said actuating member and normally serving to prevent the said relative movement of the movable contact member by the spring and to cause the contact member to move in unison with the actuating member, the said electro-responsive device being electrically connected with the said movable contact and serving upon the passage of excess current to release the movable contact member and thereby permit the said relative movement thereof by the spring, an auxiliary contact electrically connected with the fixed contact, and an extension on the movable contact adapted to engage the auxiliary contact when the said contact is moved to break the circuit.

27. In an automatic circuit breaker, the combination of a main body comprising two spaced plates, a transverse tie member between the said plates, a spindle extending transversely between the plates and rotatably mounted in bearing apertures therein, an actuating arm fixed to the spindle, a contact member comprising two spaced plates pivoted on the spindle at opposite sides of the arm and between the first said plates, two fixed electric contacts on the main body, two movable electric contacts carried by the contact member and movable therewith into and out of engagement with the respective fixed contacts, a spring for moving the contact member relatively to the spindle and arm in the direction to separate the movable contacts from the fixed contacts, a bi-metallic thermal strip carried by the contact member between the two plates thereof and electrically connected in series between the two movable contacts, the said strip serving as a latch to mechanically connect the said contact member with the said arm and upon the passage therethrough of excess current being automatically releasable to permit movement of the contact member by the spring, two auxiliary contacts mounted on the said tie member and electrically connected respectively with the said fixed contacts, and extensions on the movable contacts adapted to engage the respective auxiliary contacts when the said contacts are moved to break the circuit.

28. An automatic circuit breaker comprising in combination, a contact member pivoted for movement about a fixed axis, an actuating member pivoted coaxially with the contact member, a fixed electric contact, a movable electric contact on the contact member movable into or out of engagement with the fixed contact, a spring tending to move the contact member relatively to the actuating member so as to move the movable contact out of engagement with the fixed contact, an electro-responsive thermal strip bodily movable with the said actuating member and the said contact member and normally serving as a latch to prevent the said relative movement of the movable contact member by the spring, the said strip being electrically connected with the movable contact and serving upon the passage of excess current to release the movable contact member and thereby permit the said relative movement thereof by the spring, and magnetically controlled means acting upon the said strip to move it and thereby release the movable contact upon the passage of excess current.

29. An automatic circuit breaker comprising in combination, a contact member pivoted for movement about a fixed axis, an actuating member pivoted coaxially with the contact member, a fixed electric contact, a movable electric contact on the contact member movable into or out of engagement with the fixed contact, a spring tending to move the contact member relatively to the actuating member so as to move the movable contact out of engagement with the fixed contact, an electro-responsive thermal strip carried by the contact member and normally serving as a latch to prevent movement of the said member relatively to the actuating member, the said strip being electrically connected with the movable contact and serving upon the passage of excess current to release the movable contact member and thereby permit the said relative movement thereof by the spring, and magnetically controlled means engaging the said strip to mechanically move it and thereby release the movable contact upon the passage of excess current.

30. An automatic circuit breaker compris-

ing in combination, a body having two parallel spaced side plates, an actuating member located between the side plates of the body and pivotally movable about a fixed axis perpendicular to the said plates, a contact member located between the said side plates and pivoted for movement coaxially with the actuating member, the said contact member being biased for movement relatively to the operating member toward its open-circuit position, a stationary electric contact carried by the body, a movable electric contact carried by the contact member and movable therewith into and out of engagement with the stationary contact so as to close and open the circuit, a bi-metallic thermal strip carried by the contact member and electrically connected with the movable contact, the said strip normally serving as a latch to mechanically connect the said contact member with the said actuating member to enable the latter to operate the former and the said strip also serving upon the passage therethrough of excess current to automatically release the contact member to permit automatic movement thereof to its open-circuit position independently of the actuating member, and magnetically controlled means carried by and located between the side plates and acting upon the said strip to move it and thereby release the movable contact upon the passage of excess current.

In testimony whereof I have hereunto set my hand this 4th day of June, 1928.

JOSEPH SACHS.

## CERTIFICATE OF CORRECTION.

Patent No. 1,811,970. Granted June 30, 1931, to

JOSEPH SACHS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 25, for the misspelled word "breker" read breaker; page 2, line 27, for "insulated" read insulating, and line 49, for "extend" read extends; page 4, line 10, for "for" read or; page 7, line 27, after "95" strike out the comma; page 9, line 19, claim 6, for "operated" read operative, and line 49, claim 7, strike out the word "to"; page 10, line 63, claim 15, for "members" read member; page 11, line 126, claim 25, after the word "apertures" strike out the comma; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of August, A. D. 1931.

(Seal)

Wm. A. Kinnan,
Acting Commissioner of Patents.