Sept. 20, 1960 H. J. HAMMERLY ET AL 2,953,661

CIRCUIT BREAKER

Filed Oct. 10, 1957 3 Sheets-Sheet 1

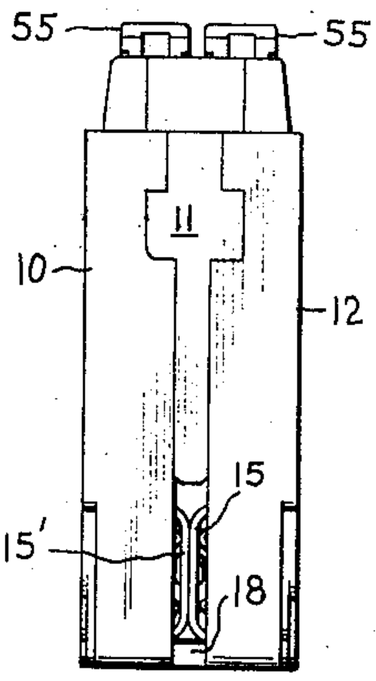

Fig. 2

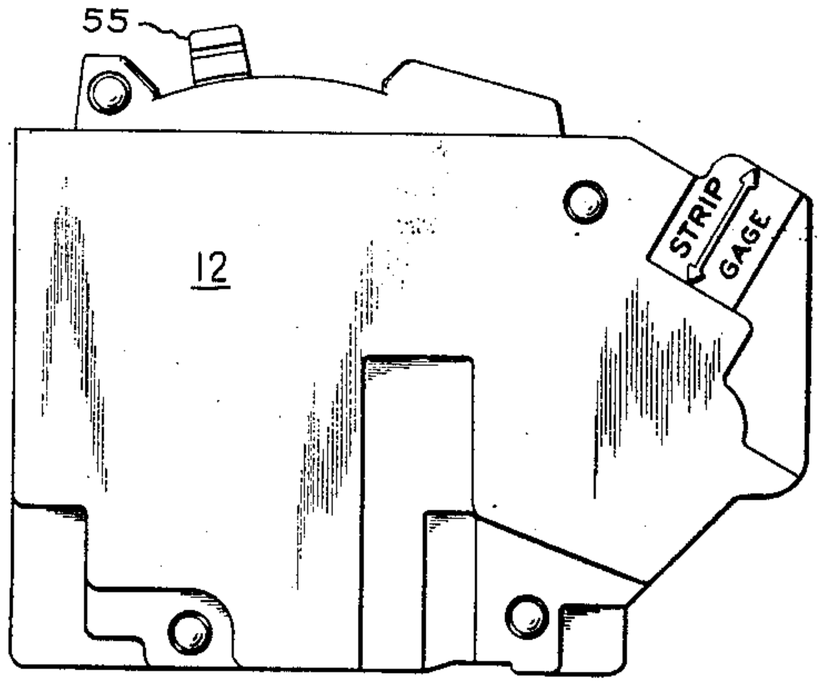

Fig. 1

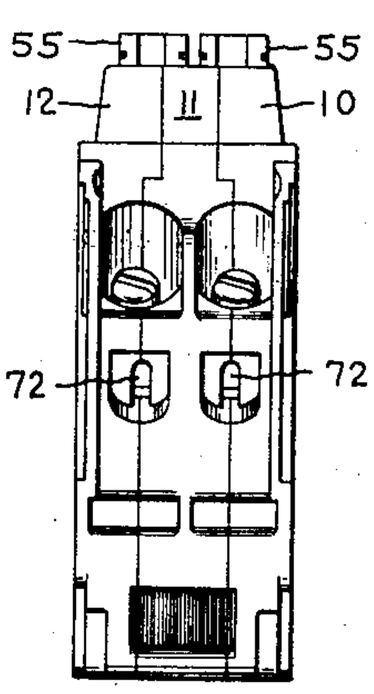

Fig. 3

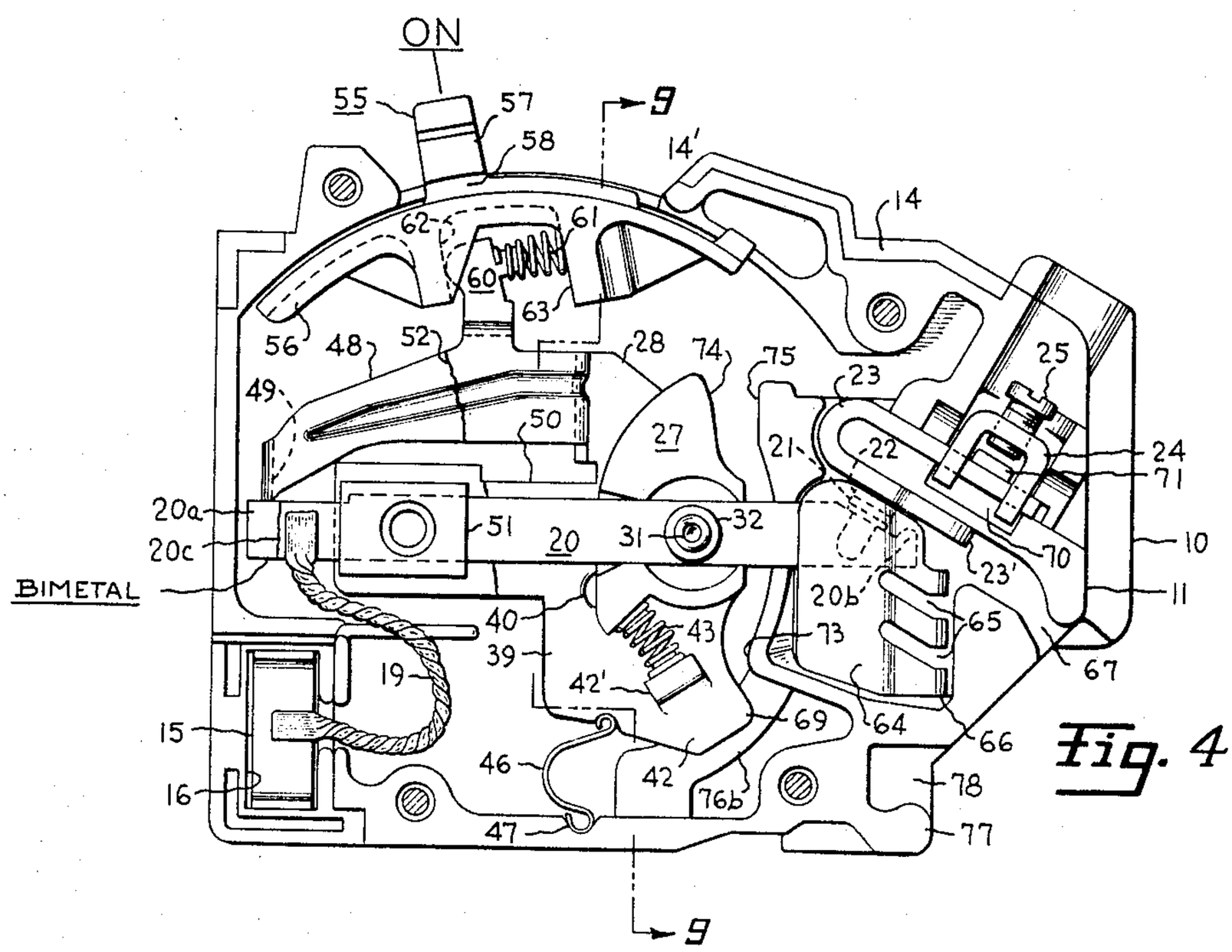

Fig. 4

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CIRCUIT BREAKER

Filed Oct. 10, 1957 3 Sheets-Sheet 2

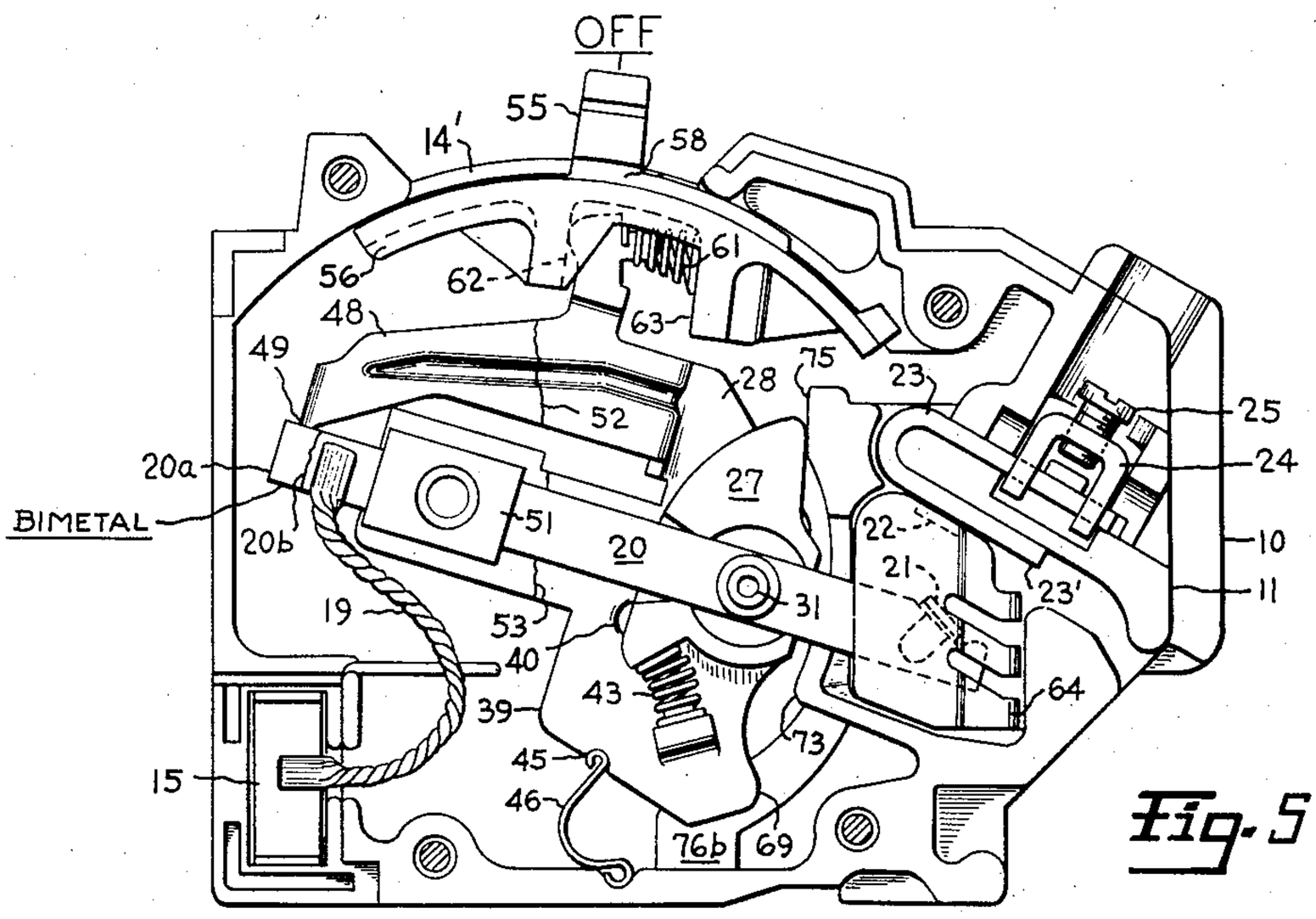

Fig. 5

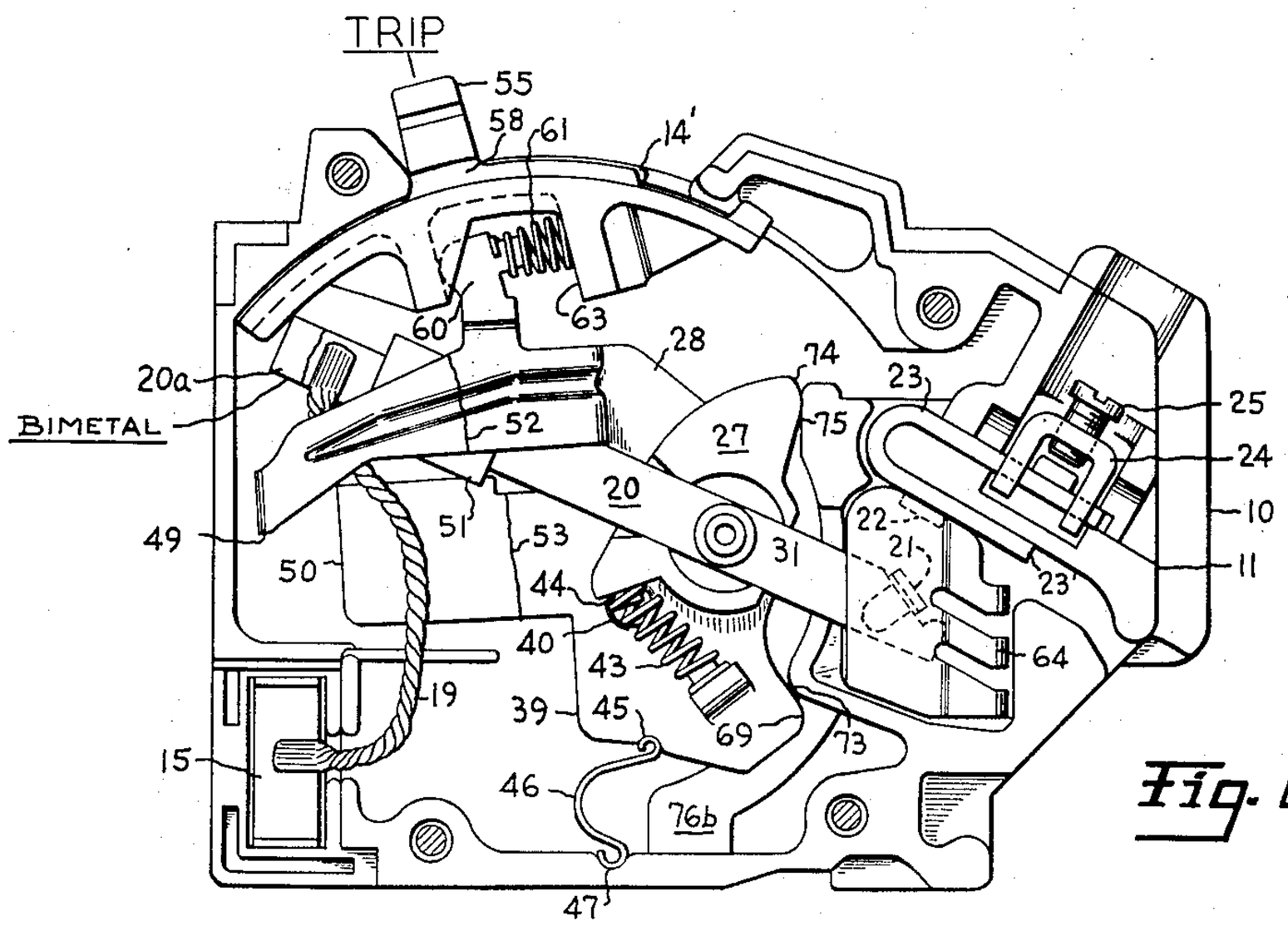

Fig. 6

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CIRCUIT BREAKER

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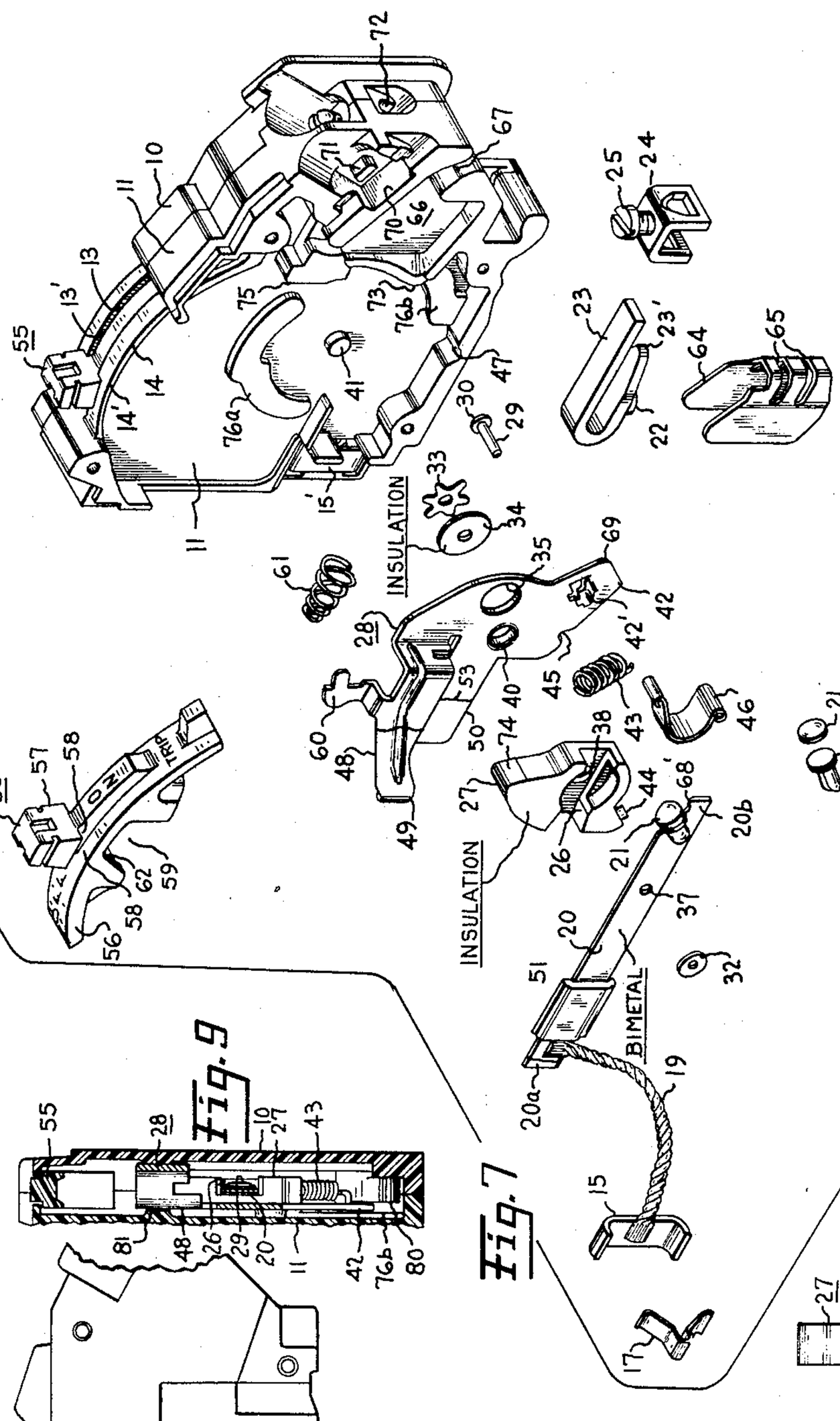

Fig. 7

Fig. 8

Fig. 9

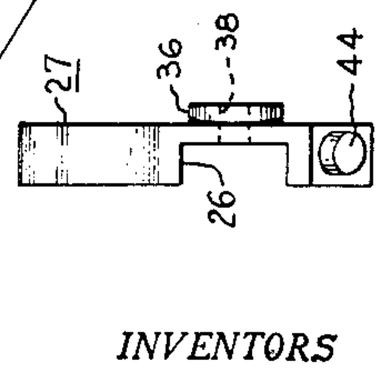

Fig. 10

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United States Patent Office

2,953,661

Patented Sept. 20, 1960

2,953,661

CIRCUIT BREAKER

Herman J. Hammerly, Plainville, and Herman A. Nadeau, Forestville, Conn., assignors to General Electric Company, a corporation of New York

Filed Oct. 10, 1957, Ser. No. 689,422

11 Claims. (Cl. 200—88)

Our invention relates to electric circuit breakers, and particularly to small electric circuit breakers adapted for use in the control of branch lighting and power circuits.

Prior art circuit breakers of the type referred to incorporate operating mechanisms which require a casing of substantial width, thereby limiting the number of such circuit breakers which can be mounted side-by-side in a given panelboard. Such prior circuit breaker mechanisms are also relatively expensive, largely because of their requiring relatively expensive materials such as molded plastic insulation and copper. Additional expense is often involved, furthermore, if combined thermal and magnetic tripping means is desired. Such mechanisms also are not well suited to automated production techniques, and especially to automatic calibration. In providing a compact circuit breaker which is suitable for automated production techniques including automatic calibration, it is desirable that the current-responsive member be made an integral part of the contact operating mechanism. By this means, the mechanism may be assembled and calibrated by automatic means and then inserted into a suitable enclosing casing.

When the current-responsive member is made part of the contact operating mechanism, however, certain problems are introduced because of the repeated impact action of the contacts which is transmitted to the latching members, including the current-responsive means. This action causes the latching surfaces to become distorted, with consequent erratic tripping action. This is a particularly serious problem when the movable contact is mounted directly on one of the latching elements, such as on the current-responsive member and when the operating mechanism is of the quick-made or snap-action type.

It is an object of our invention to provide a circuit breaker including a mechanism which can be made extremely thin, and particularly one which can be contained within a chamber of less than half the thickness of that required by prior circuit breakers of the same type and rating.

It is another object of our invention to provide a circuit breaker including a mechanism which requires a minimum of relatively expensive materials.

Another important object of our invention is to provide an electric circuit breaker which is adapted for automated production techniques, including automatic calibration.

A further important object of our invention is to provide an electric circuit breaker having a sliding type of latch engagement which affords a consistent tripping action despite repeated impact between the two latch-engaging surfaces.

Another object of our invention is to provide a circuit breaker including contacts which have a constant self-cleaning action, even in the absence of current thru such breaker.

In accordance with our invention, we provide an electric circuit breaker having an insulating casing and a generally planar metallic frame member pivotally supported

therein and adapted to be moved with an overcenter spring action between open and closed circuit positions by a manually operable handle projecting through the top wall of the casing. A bimetallic strip member is pivotally mounted on one side of the frame member and carries a contact at one end portion and a latch engageable with the frame member at the opposite end portion. The bimetallic strip is biased for rotation about its pivot point by a tripping spring, but is normally latched against such rotation by a latch projection carried by the frame member.

In accordance with our invention, we also construct the frame member of ferromagnetic material, such as sheet steel, and arrange a portion thereof in closely spaced relation to the working portion of the bimetallic strip. On high overload currents, such for instance as short-circuit currents, an attraction is set up between the bimetallic strip, which is carrying electric current, and the ferromagnetic frame member. This force is in the same direction as that in which the bimetal deflects when warped by heat along, and this magnetic action therefore supplements the thermal action to accelerate tripping on intermediate overloads. On high overloads the magnetic force alone is sufficient to cause tripping, providing an instantaneous tripping action. The magnetic action is further intensified in accordance with our invention by the provision of a body of ferromagnetic material fixedly attached to the bimetallic member on the side opposite the ferromagnetic frame member.

In accordance with another aspect of our invention, we provide a circuit breaker having a sliding type of latching engagement, one of the latching surfaces being of a metal of relatively high hardness, and the other of the latching surfaces being of a metal of medium or high hardness having a coating of predetermined thickness of relatively soft metal thereon to provide a low-friction, high-impact resistant latch.

In accordance with another aspect of our invention, the bimetallic strip is pivotally supported in such a way that a substantial length extends on either side of the pivot point. Thus a length of bimetallic strip is provided between the movable contact and the pivot point of the bimetallic strip. This length of bimetal deflects or "warps" with changes in temperature and provides a contact wiping or scrubbing action, even when no current is passing through the circuit breaker, thereby keeping the contact surfaces clean.

Other aspects of our invention will in part be pointed out and in part will become apparent as the following detailed description proceeds, and the particularly novel aspects thereof will be pointed out in the appended claims.

In the drawings,

Figure 1 is a side elevation view of a dual circuit breaker comprising a single insulating casing including two circuit breakers constructed in accordance with our invention, both handles being shown on the "on" position;

Figure 2 is an end elevation view of the circuit breaker of Figure 1, showing the line terminal;

Figure 3 is an end elevation view of the circuit breaker of Figure 1 showing the load terminals;

Figure 4 is a side elevation view of the circuit breaker of Figure 1 with one side of the circuit breaker casing removed to show the parts, the mechanism being shown in the "on" circuit position;

Figure 5 is a side elevation view of the circuit breaker of Figure 1, the parts being shown in the "off" position;

Figure 6 is a side elevation view of the circuit breaker of Figure 1, the parts being shown in the "tripped" position;

Figure 7 is an exploded view in perspective of the circuit breaker of Figure 1 showing one circuit breaker

mechanism in assembled condition and one circuit breaker mechanism in exploded relation;

Figure 8 is a side elevation view, with a portion broken away, of a modified form of the invention showing particularly a modified handle construction;

Figure 9 is a sectional view taken on a line generally as indicated by the line 9—9 of Figure 1; and

Figure 10 is an elevation view of an insulating spacer used in the circuit breaker of Figure 1.

Referring to the drawings, we have shown our invention as embodied in an electric circuit breaker having an insulating casing comprising three sections **10**, **11** and **12**. Each of the sections **10** and **12** includes a generally planar side wall portion forming an outer side of the complete circuit breaker assembly casing, and peripheral wall portions **13**, which together with corresponding peripheral wall portions **14** of the center section **11**, form two side-by-side circuit breaker chambers each adapted to receive and support an independent electric circuit breaker.

The general dual circuit breaker arrangement aspect of the device shown herein forms a part of the subject matter of application Serial Number 689,421, filed concurrently herewith, by H. J. Hammerly and N. L. Miller, and assigned to the same assignee as the present invention.

Since each of the two circuit breakers included in the circuit breaker of Figures 1 to 3 are identical, only one will be described.

In accordance with our invention, we provide an electric circuit breaker including a plug-in type line terminal **15** comprising a generally C-shaped conductive member adapted to be received within a correspondingly shaped recess **16** in the casing side **12** and to be resiliently supported therein by a generally V-shaped resilient member **17**. The line terminal member **15** is preferably arranged in juxtaposed relation to a similar line terminal **15'** associated with the circuit breaker contained in the other recess, both of said line terminal members being made accessible through an aperture **18** in the circuit breaker assembly casing. Certain aspects of the line terminal construction and arrangement disclosed herein form a part of application Serial Number 689,420, filed concurrently herewith by J. F. Johnson, and assigned to the same assignee as the present invention.

The circuit breaker further includes a foot mounting portion **77** and a corresponding recess **78** adapted to receive a mounting lug by which the circuit breaker may be releasably retained at the load end, and about which it may readily be pivoted to move the opposite end into mounted engagement with a suitable contact.

The line terminal **15** has a flexible conductor **19** or braid attached thereto by a suitable means such for instance as by brazing, the other end being connected to an elongated bimetallic strip **20**. The bimetallic strip **20** carries a movable contact **21** at its opposite end, adapted normally to contact a relatively stationary contact **22** mounted on a generally U-shaped load terminal strap **23**. The other end of the load terminal strap **23** extends through aligned apertures in a generally U-shaped clamping member **24** having a screw **25** threaded in the bight portion thereof. In use, a suitable load conductor is inserted through the apertures in the member **24** and is clamped against the strap **23** by the screw **25**.

The circuit through the circuit breaker, when in the closed condition, may therefore be traced as follows from a suitable current source (not shown) to the line terminal **15**, through the flexible braid **19** to one end of the bimetallic strip **20**, through the bimetallic strip **20** to the movable contact **21**, to the stationary contact **22**, to the U-shaped load terminal strap **23**, and thence to an outgoing load conductor, not shown.

The bimetallic strip **20** is adapted to be received within an elongated channel-shaped recess **26** in the insulating spacer member **27** (see Figure 7). Both the bimetallic strip **20** and the spacer member **27** are pivotally supported on a frame member **28** by means of a pivot pin or rivet **29** passing through openings **37** and **38** in the strip **20** and the spacer **27** respectively. The pin **29** has a head portion **30**, and the other end is spread or spun to form an enlarged retaining head **31** on the opposite end over a suitable retaining washer **32**. In order to firmly support the bimetallic strip **20** and the spacer member **27** on the frame member **28**, a resilient generally star-shaped washer **33** is also included under the head **30** of the pin **29**.

The washer **33** is insulated from the frame **28** by means of an insulating washer **34**. Also, the insulating member **27** includes a circular boss **36** surrounding the hole **38** and adapted to be received within the hole **35** of the frame **28**, thus insulating the pin **29** from the frame **28**. The bimetallic strip **20** is therefore electrically insulated from the frame **28** at the pivot region. This prevents any current from braid **19** from being diverted around the bimetal **20** by the frame **28**.

The frame member **28** is preferably formed of relatively thin, flat metallic material, and more particularly of ferromagnetic material such as steel. The frame member **28** includes a main bearing portion **39** having an opening **40** therein. The central casing part **11** includes a projecting cylindrical boss **41** adapted to fit closely within the opening **40** to provide a pivotal support for the frame member **28** in the enclosing casing.

The frame member **28** also includes an extension **42** having a lug **42'** adapted to support one end of a compression spring **43** having its other end pressing against the spacer member **27**, surrounding a boss **44** thereon. The frame member **28** also is provided with a notch **45** adapted to receive and position one end of a compression spring **46** which has its other end seated in matching notches **47** in the casing walls **13** and **14**. The overcenter spring **46** is adapted to shift its line of action across the pivot point of the frame member **28** on the boss **41** to maintain the frame member in either its "on" or "off" position.

The frame member **28** also includes an integral offset extension **48** extending generally parallel to but in a plane spaced away from the plane of the main bearing portion **39**. The extension **48** is provided with a latch portion **49** extending generally at right angles to the plane of the extension **48** and adapted to engage the latching end **20***a* of the bimetallic strip **20**. Since the frame member **28** is constructed of relatively thin metallic material, the particular relationship between the end portion **20***a* of the bimetallic strip and the latch portion **49** of the extension **48** may be readily varied by bending or deforming the frame member **28** so as to change the particular relation of the portion thereof supporting the bimetallic strip and the latch portion **49**. This, for instance, may readily be done by bending the extension **48** at a portion thereof between the latch portion **49** and the handle engaging extension **60**.

The bimetallic strip **20** is so constructed and arranged that when heated by current passing therethrough, it warps in such a way as to move the outer latch end **20***a* toward the main portion of the frame **28** and disengages the end **20***a* from the latch portion **49**. When this occurs, the trip spring **43** moves the spacer member **27** and the bimetallic strip **20** clockwise as viewed in Figure 4 to the automatically tripped position such as shown in Figure 6.

We have discovered that an optimum latch action is obtained by coating the latch end **20***a* of the bimetallic strip **20** with a thin coating **20***c* of relatively soft metallic material, such for instance as a material having a hardness in the range of 50 to 130 as measured on the Brinell 500 kilogram hardness scale. The coating may be of any convenient thickness not less than .0005 inch, and preferably is in the range of .001 to .003 inch, and may be

applied in any convenient manner such as by brazing, welding or plating.

In a particular embodiment, adapted for control of a 15 ampere circuit, for example, the latch portion **20***a* was constructed of General Plate Company S–130 bimetallic material having a coating of silver alloy .002 inch in thickness, applied to the latch surface **20***a* by induction brazing. The sliver alloy used was Handy and Harman Company "Easy-Flow #45" silver solder, having the following composition and hardness.

	Percent
Silver	45
Tin	50
Zinc and Cadmium	5

Hardness 125 Brinell 500 kg. scale

While the coating is relatively soft, it cannot be too soft, such, for instance as pure lead, pure tin, or conventional "solder" comprising 60% lead and 40% tin, since such soft materials do not provide the impact-resisting action desired. Silver and sliver alloys, however, have been found to be particularly effective.

It has been observed that a circuit breaker constructed in accordance with our invention including a latch surface coated as described maintains a consistent tripping action after many operations of the breaker, even after the latch surfaces have become noticeably distorted in appearance because of the impact action. Experiment has demonstrated, for instance, that circuit breakers constructed as shown but with a conventional ground and polished latch surface arrangement, the irregularities caused by impact action are such that even with the utmost care, no more than about 50% of such breakers will successfully pass calibration tests such as required by Underwriters Laboratories. When the latch construction of the present invention is utilized, however, more than 99% of such breakers successfully pass the required tests.

The frame member **28** is provided with an integral extension **50** co-planar with the main bearing portion **39** and extending in closely spaced opposed relation to the main working portion of the bimetallic strip **20** when the bimetallic strip is in its normal latched position as shown in Figure 4. Since the frame **28** is constructed of ferromagnetic material, and the bimetallic member **20** is conducting current, an attraction is set up between these two members whenever the bimetallic strip carries current. While this attraction is negligible on normal currents, it becomes substantial on high overload currents such for instance as short-circuit currents. When this occurs, the bimetallic strip **20** is deflected toward the extension **50** thereby providing an instantaneous tripping action. This action is further amplified and rendered more sensitive by the provision of a magnetic armature member **51** which is preferably rigidly attached to the bimetallic strip **20** to intensify the magnetic field.

The extension **48** of the frame member **28** and the outer portion of the magnetic field portion **50** are preferably at least partially covered with a coating of suitable insulating material **52** and **53** respectively such for instance as paint or lacquer. The insulating coating **52** on the extension **48** prevents any short circuiting which might occur following tripping when the magnetic armature **51** moves up closely adjacent the extension **48** as shown in Figure 6. The coating **53** on the extension **50** prevents the armature **51** from temporarily sticking in a closed position as it might do on high short circuit currents when attracted suddenly to the field piece **50**.

The movable contact **21** is mounted on the edge of the bimetallic strip **20** by means of a bifurcated, headed stud **54**, the legs of which are adapted to straddle the bimetallic strip **20**. The stud **54** is fastened to the strip **20** by suitable means such as by brazing or welding, and the contact **21** is attached to the stud by the same or similar means. This mounting arrangement provides a firm, dependable mounting connection of the contact on the strip **20**, is relatively easy to provide and affords good thermal transfer between the contact and the bimetallic strip.

The frame member **28** is adapted to be oscillated about its pivotal support **41** by means of a manually operable handle member **55**. The handle member **55** has an arcuate main portion **56** adapted to be received within each circuit breaker recess and a manually engageable portion **57** adapted to project outwardly from the circuit breaker casing. A space or notch **58** is provided between the arcuate portion **56** and the manually engageable portion **57**. The notch **58** is adapted to receive arcuate portions **13'** and **14'** of the peripheral walls **13** and **14** of the casing parts **10**, **11** and **12**. This engagement supports the handle **55** with respect to the casing, and also provides an arcuate track for guiding the movement of the handle.

The handle **55** has a recess **59** in the main arcuate portion **56** thereof, which is adapted to receive a projecting lug portion **60** of the frame member **28**. The recess **59** is made considerably larger than the projection **60**, and a compression spring **61** is positioned between the projection **60** and the arcuate portion of the handle **55**. The compression spring **61** urges the projection **60** against the wall portion **62** of the recess **59**. When the parts of the circuit breaker are in the closed circuit position as shown in Figure 4, therefore, and the handle member **55** is moved clockwise toward the off position, the frame member **28** will be immediately moved by the handle. The contacts **21** and **22** will therefore separate at a speed controlled by the speed of movement of the handle. This action is referred to as "slow break." It is well recognized in the art that this type of slow breaking action is very desirable on alternating currents since an arc drawn by the separation of such contacts will not have time to be unduly lengthened before the current reaches a "current zero" point at which time the arc will go out of its own accord. The arc will not thereafter restrike because the air between the contacts forms a high dielectric insulation. Continued movement of the handle in the clockwise direction moves the frame member **28** clockwise about its pivot point and compresses the overcenter spring **46** which then goes overcenter until the parts assume the "off" or open circuit position as indicated in Figure 5.

When the parts are in the open circuit position such as shown in Figure 5, and the handle **55** is moved from the off toward the on position, that is counterclockwise as viewed, the initial movement of the handle **55** compresses the spring **61** but does not immediately cause motion of the frame member **28** or its associated parts. This is because the overcenter spring **46** is considerably stronger than the handle spring **61**. Continued movement of the handle member **55** in the counterclockwise direction, however, causes the wall portion **63** of the recess **59** to engage the rounded projection portion of the projection **60**, thereby initiating movement of the frame member **28**. Further movement of the handle **55** causes the frame member **28** to rotate in a counterclockwise direction until the compression spring **46** goes overcenter. When this occurs, the frame member **28** moves further in a counterclockwise direction at a speed which is not restricted by the motion of the handle, because of the lost motion spacing existing between the projection **60** and the wall **62** of the handle **55** at this time. The contact **21** therefore moves to a closed circuit position with a snap-action, providing a "quick-make" closing action, the force of handle spring **61** being added to that of the overcenter spring **46** in accelerating the contact to closed position. This type of action is generally desirable in circuit breakers because it prevents the operator from moving the contacts into a slowly or partially engaging position in which serious arcing or burning might occur because the contacts are only in poor contact with each other. Certain aspects of the handle construction and

its mounting and connection with the operating mechanism form a part of the subject matter disclosed and claimed in application Serial Number 689,419, filed concurrently herewith by J. F. Johnson and assigned to the same assignee as the present invention.

It will be observed that the circuit breaker comprises essentially only two moving parts, (*a*) the frame member and (*b*) the bimetallic strip, which performs the dual functions of a current-responsive member and a switching or contact-carrying member.

In order to minimize the deleterious effects of arcing, between the contacts **21** and **22**, we provide a generally U-shaped arc extinguishing member **64**, preferably of ferromagnetic material, such as steel. The arc cooling member **64** is constructed of conductive metallic material and has a plurality of slots **65** cut in the bight portion thereof. The arc cooling member **64** is positioned in generally conforming recesses **66** in the cooperating casing members. Provision is likewise made for the expulsion of arc gases by means of the venting passageway **67**.

The contacts **21** and **22** are further protected from the effects of arcing by means tending to rapidly remove any arc drawn between these contacts away from the contact surfaces even before the arc is extinguished. This means includes an extension **23'** of the load terminal member **23** which acts as an arc runner extension, and an extension **20***b* of the bimetallic member **20** which terminates in a rounded projecting portion **68** extending close to the arc runner portion **23'**.

The action of the various parts of the arc extinguishing structure is such that upon the drawing of an arc between the contacts **21** and **22**, it is immediately transferred to the tip **68** of the arc extension **20***b* and the arc runner **23'** by the magnetic action of the arc cooling member **64**, and thereafter is expelled through the arc venting chamber **67**. Certain aspects of the arc cooling and extinguishing structure described and shown herein form a portion of the subject matter disclosed and claimed in application Serial Number 689,423, filed concurrently herewith by H. A. Nadeau and assigned to the same assignee as the present invention.

The end of the load terminal member **23** extends through aligned apertures in the clamping member **24**, which is preferably constructed of steel or other inexpensive strong material. These parts are positioned within the cooperating casing portions by corresponding recesses and bosses. The U-shaped clamping member **24** may be easily slid onto the end of the load terminal member **23** when the parts are out of the casing. When the parts are in the casing, however, the U-shaped member **24** is trapped in place since the ends thereof fit closely in a recess **70** in the casing. The casing also includes bosses **71** which extend a short distance within the clamping member **24**. When a conductor is inserted into the clamping member **24** and clamped against the member **23** by the screw **25**, the bosses **71** serve to limit the sideways spreading of the conductor and to hold it under the end of the screw **25**. The maximum size of conductor which may be inserted within the clamping member **24** is restricted by the restricted openings **72** in the casing at this point.

When the parts are in the closed circuit position as shown in Figure 4, and an overload occurs, the bimetallic strip **20** warps or deflects toward the frame **28** until the latch portion **20***a* is disengaged from the latch **49** as described above. Thereupon the compression spring **46** moves the frame member **28** slightly counterclockwise until the extension portion **69** engages the abutment **73** of the casing. At the same time, the tripping spring **43** moves the carrier member **27** and bimetallic member **20** clockwise until the surface **74** of the carrier **27** engages the abutment **75** of the casing.

Since the frame member **28** moves in a counterclockwise direction, as viewed, when tripping occurs, it carries the handle **55** also in this direction, moving the handle to

a distinct "trip indicating" position as shown in Figure 6, slightly beyond the "on" or closed circuit position.

In order to reset the circuit breaker following an automatic tripping operation, it is only necessary to move the handle **55** and the frame **28** clockwise toward the "off" position. Since the carrier member **27** is up against the abutment **75** at this time, it maintains substantially the same position as shown in Figure 6 while the frame member **28** is rotated and until it once again assumes its normal or relatched position as shown in Figure 5.

The frame member **28** is supported as previously described by the generally cylindrical boss **41**. In its movements, however, the entire movable assembly is supported and guided by sliding contact with the corresponding side walls of the circuit breaker recess in which it is positioned. For the purpose of providing such guiding with a minimum of friction, raised bosses are provided on the corresponding side walls. Thus the bosses **76***a* and **76***b* are provided on the side wall of the central casing section **11**. The boss **76***a* engages and slidably guides the portions of the frame member **28** comprising the main bearing portion as well as the extension **50**. The extension **42** is guided for sliding movement between the boss **76***b* on one casing wall and boss **80** on the opposite wall. In addition, the boss **81** is adapted to engage and guide the movement of the portion **48**. Thus the entire mechanism is guided and slidably supported between the corresponding walls of the supporting casing by engagement with the frame member **28**. The generally planar frame member **28** therefore has a portion thereof in sliding engagement with one wall of the enclosing casing, and has another portion in engagement with the opposite wall of the casing. It will therefore be observed that its acts as a double-walled frame, but nevertheless can be easily and inexpensively formed, without fastening operations and without U-type bends.

It will at once be apparent that many modifications of our invention may readily be made by those skilled in the art, and we therefore intend by the appended claims to cover all such modifications as fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An electric circuit breaker comprising an insulating casing, a stationary contact carried by said casing, a frame member pivotally supported in said casing, an elongated bimetallic strip pivotally supported intermediate its ends on said frame member and having a releasable latch engagement with said frame member at one end, and a contact member mounted on an edge portion of said bimetallic strip at the other end thereof and movable into and out of engagement with said stationary contact.

2. An electric circuit breaker comprising a casing of insulating material, a frame member of ferromagnetic material pivotally supported in said insulating casing and having a main bearing portion and two parallel spaced apart integral extensions, a bimetallic strip pivotally supported on said main bearing portion, one of said extensions having a latch portion normally engaging said bimetallic strip at one end to prevent rotation thereof about its pivotal support, the other of said extensions acting as a magnet to attract said bimetallic strip on the occurrence of high short-circuit currents, said two parallel frame extensions being displaced so as not to be in opposed relation, said bimetallic strip, when in latched position, being closely spaced from said magnetic extension, whereby said latch extension normally has no subtractive effect on the magnetic attraction between said bimetallic strip and said magnetic extension.

3. An electric circuit breaker comprising an insulating casing, a generally planar frame member pivotally supported at one point in said casing, an overcenter spring means between said frame and said insulating casing adapted to shift its line of action from one side to the other of said pivot, a manually operable handle having

a portion projecting from said casing and another portion adapted to move said frame member, an elongated bimetallic strip pivotally mounted on said frame member at one side thereof and having a releasable latch engagement therewith at one end, said bimetallic strip having its major planar surface extending generally parallel to and closely spaced from said frame member, said bimetallic strip also having a portion extending beyond said pivot point opposite said latch end and a contact mounted on said extension.

4. An electric circuit breaker comprising at least two relatively movable contacts, at least two interengaging latching members comprising a releasable member movable to cause opening movement of said contacts, and a restraining member normally engaging and restraining said releasable member, at least one of said latching members comprising a member having a coating of relatively soft metallic material thereon.

5. An electric circuit breaker as set forth in claim 4 wherein said one of said latching members comprises a metallic member having a coating thereon of a relatively soft metallic material comprising silver.

6. An electric circuit breaker as set forth in claim 4 wherein said one of said latching members comprises an elongated bimetallic strip.

7. An electric circuit breaker comprising at least two relatively movable contacts, a releasable member movable to cause opening movement of said contacts, biasing means biasing said releasable member for movement in said direction, latch means normally engaging and restraining said releasable member, at least one of said releasable members and said latch member comprising a member having a coating of metallic material thereon having a hardness in the range of 50 to 130, measured on the Brinell 500 kilogram hardness scale.

8. An electric circuit breaker comprising a pair of interengaging latch members at least one of which is constructed of metallic material of at least medium hardness, and having a coating of relatively soft metallic material thereon, said coating having a thickness between .001 and .003 inch.

9. An electric circuit breaker comprising an insulating casing, a generally planar sheet metal frame member, an elongated bimetallic strip member pivotally mounted on said frame member at a point intermediate its ends, an insulating carrier positioned between said bimetallic strip

and said frame member at said pivot point and having a non-rotatable engagement with said bimetallic strip, said bimetallic strip, said carrier and said frame member all being fastened together by a pivot pin passing through aligned holes in each of said pieces.

10. An electric circuit breaker as set forth in claim 9 wherein said electric circuit breaker also includes a pivot pin having its opposite ends headed for retaining said parts in assembled relation and resilient means adjacent at least one of said headed ends for maintaining said parts in close engagement with predetermined amount of pressure.

11. An electric circuit breaker comprising an insulating casing, a frame member formed of thin, flat ferromagnetic material and having a main bearing portion, a magnet field piece portion, a latch portion, a handle portion, a trip spring supporting portion, and an overcenter spring supporting portion, an insulating spacer pivotally mounted on said main bearing portion, an elongated bimetallic strip mounted on said insulating spacer and having an operating portion closely spaced from said magnet field piece portion, a magnet carried by said offset bimetallic strip, a trip spring between said trip spring supporting portion and said insulating spacer urging said insulating spacer for rotation about its pivotal support, a latching portion at one end of said bimetallic strip adapted to engage said latch portion to prevent rotation, a manually operable handle of insulating material adapted to engage said handle portion of said frame member and an overcenter spring between said spring supporting portion and said insulating casing.

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