Sept. 1, 1964 J. H. LEONARD 3,147,353

CONTACT WELD BREAKING MEANS

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FIG. 1.

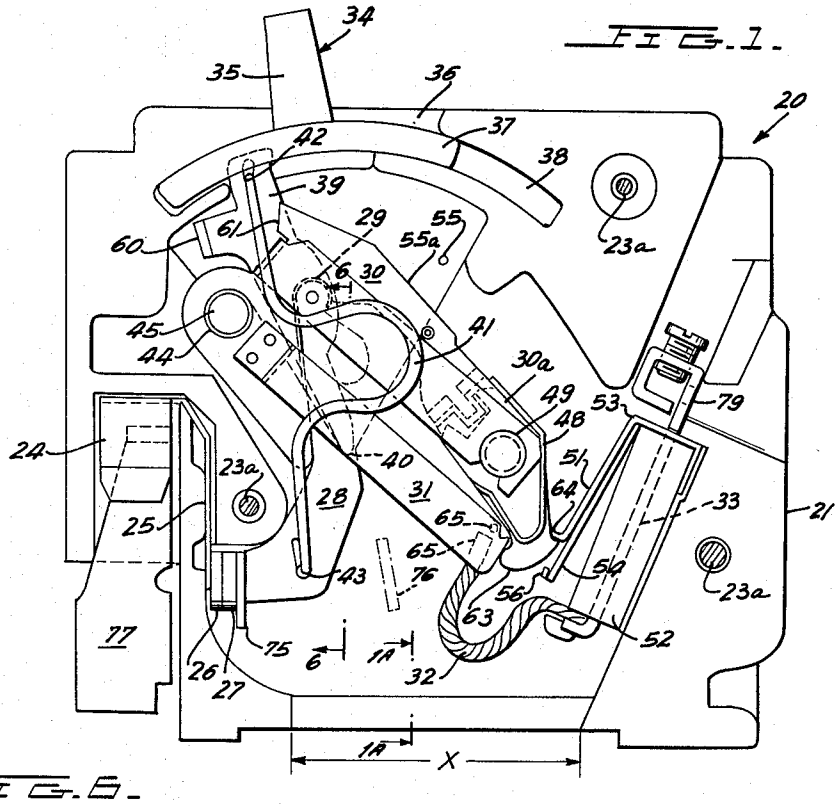



FIG. 6.

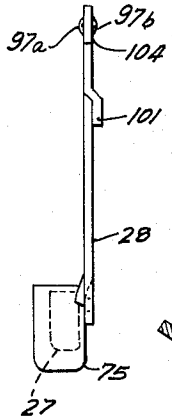



FIG. 5.

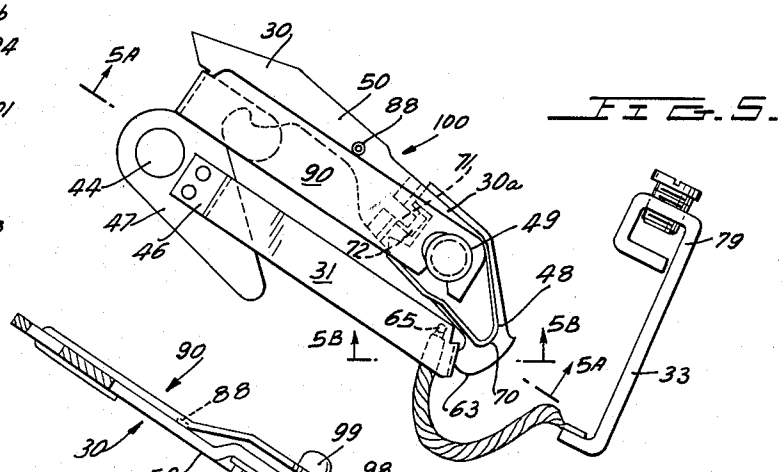



FIG. 5B

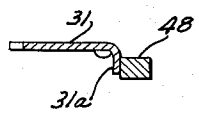



FIG. 5A

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CONTACT WELD BREAKING MEANS

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FIG. 2.

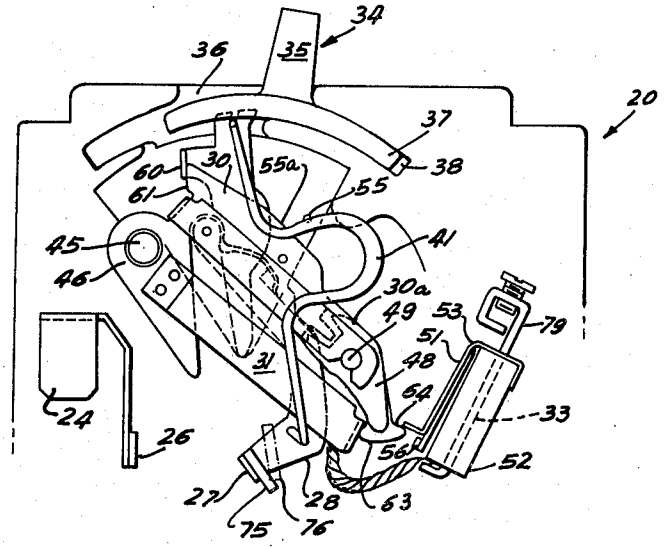
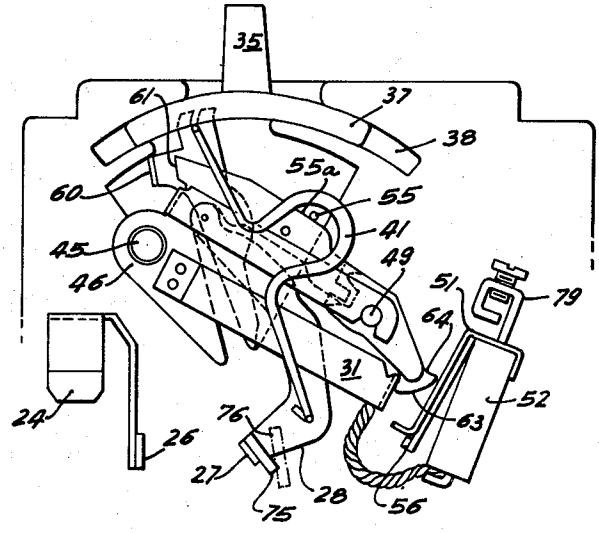



FIG. 3.




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Sept. 1, 1964 J. H. LEONARD 3,147,353

CONTACT WELD BREAKING MEANS

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FIG. 4.

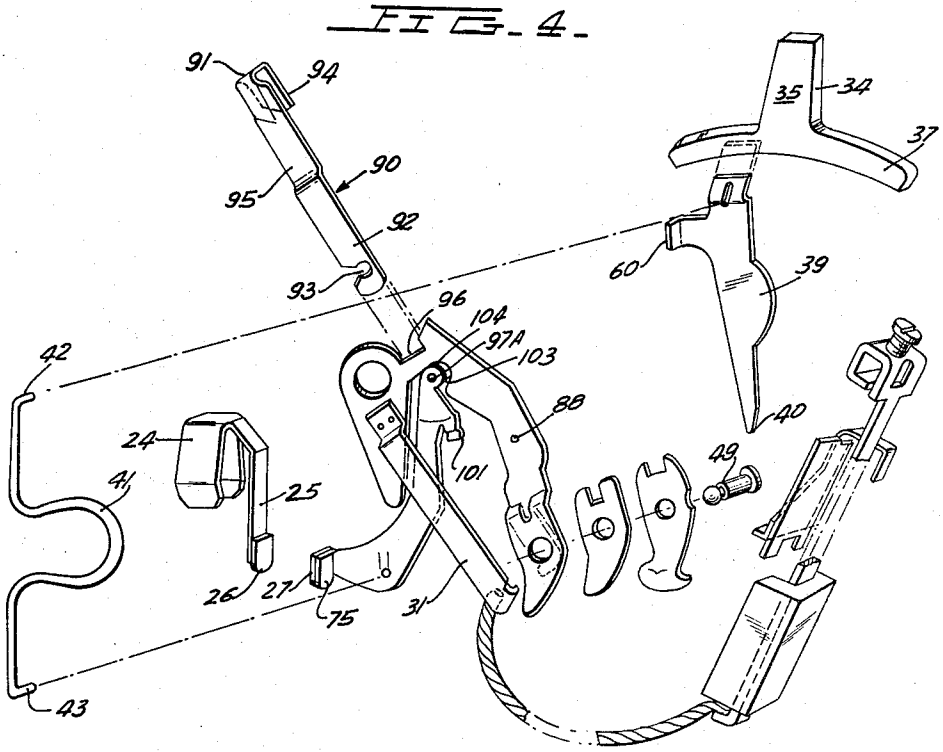



FIG. 7.

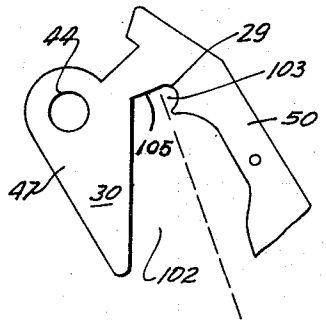



FIG. 8.

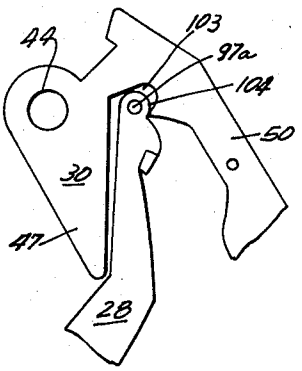
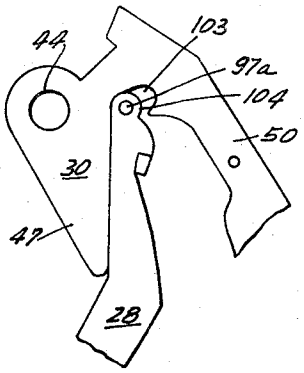



FIG. 9.



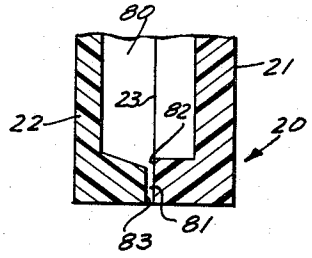




FIG. 1A.

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United States Patent Office

3,147,353

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3,147,353

# CONTACT WELD BREAKING MEANS

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Filed Dec. 23, 1960, Ser. No. 77,976

10 Claims. (Cl. 200—116)

The instant invention relates to circuit breaker mechanisms housed within narrow molded casings and more particularly to novel means for the breaking of welds formed at the cooperating contacts.

In recent years it has been the practice to construct circuit breakers for home and light industrial applications with casings whose widths are one inch or multiples thereof. More recently, the trend has been to supply individual circuit breaker protection to many circuits even those carrying light loads. Because of this, the capacity of existing panelboards, while sufficient electrically, were not sufficient in physical size to accommodate the greater numbers of circuit breakers. Further, panelboards having the requisite physical size to accommodate the greater number of circuit breakers were wasteful of material and space.

Thus, it became necessary to construct circuit breakers having narrow housings. For example, a typical circuit breaker of 20 amp rating was usually provided with a molded casing having a one inch width. A circuit breaker of this rating can be replaced by a circuit breaker whose molded insulating housing is one-half inch in width.

In the circuit breaker of this type described in the J. H. Leonard copending application Serial Number 11,768, filed February 29, 1960, entitled "Circuit Breaker Having Bimetal Rigidly Secured to Cradle," and assigned to the assignee of the instant invention, a latch means is provided which is comprised of main and intermediate latch members with the intermediate latch member having one portion thereof utilized as a latch surface for magnetic tripping and another portion utilized as a latch surface for the thermal tripping, The bimetal, or thermal tripping element, is positioned to deflect out of the plane of movement of the releasable cradle to which the bimetal is affixed while the latch members are arranged to pivot around axes perpendicular to the releasable cradle.

Until automatic tripping has actually occurred the relationship between the bimetal and intermediate latch member is unaffected by the position of the main latch member which is movable directly through the action of the magnetic tripping device. Similarly, a deflection of the bimetal will in no way effect the relationship between the elements comprising the magnetic trip means.

The absolute independence of the thermal and magnetic trip device results in the advantage of being able to adjust the trip characteristics of the breaker so as to achieve low magnetic tripping without utilizing a coil. Further, the thermal tripping characteristic may be calibrated prior to installing the thermal trip unit into the circuit breaker case. The latter is accomplished by providing a sub-assembly comprising a releasable cradle, the bimetal having one end rigidly secured to the cradle and the intermediate latch member pivoted to the cradle and operatively positioned so as to cooperate with the free end of the bimetal to form the latch for the thermal tripping means.

In the circuit breaker described in the aforesaid co-



pending application 11,768, it was found that it was not unusual for welds to form between the cooperating contacts. Often the strength of the main operating spring was not great enough to break these welds either during manual or automatic tripping.

In order to overcome this difficulty during manual operation, the contact arm is provided with an offset positioned in the path of movement of the operating handle extension so as to be engaged thereby during manual opening. Thus, the manual opening force is applied directly to the contact arm to break any welds between the cooperating contacts.

In the case of automatic tripping it has been found that in prior art constructions at the instant the cradle is released the main operating spring furnishes a mere shear force acting to separate the cooperating contacts. This shear force often is not of sufficient magnitude for breaking of the contact welds.

In order to overcome this difficulty, the instant invention provides a novel configuration for the contact arm and cradle in the conducting joint region. This construction is such that the component of force is produced which acts upon the contact arm in such a direction that a bending moment is produced of sufficient magnitude for breaking of contact welds.

This construction includes a reentrant offset portion to the cradle notch which receives the contact arm. The contact arm in turn is provided with a portion of reduced size which is normally disposed within the reentrant notch portion. When the cradle is released the contact arm moves out of the reentrant notch portion and engages a surface of the cradle which is appropriately shaped and positioned so that the main spring exerts a component of force which is effective to produce a bending moment for the breaking of contact welds.

Thus, a primary object of this invention is to provide a novel construction for a narrow molded case circuit breaker which is economical to construct, is reliable in operation, and is simple to calibrate.

Another object is to provide a circuit breaker of this type having novel means for the breaking of contact welds.

Still another object is to provide a circuit breaker of this type having a novel construction in the conducting joint region between the contact arm and cradle, whereby the main spring is effective to exert a force acting in a direction to produce a bending moment tending to produce relative motion between the cooperating contacts rather than exerting a mere shear force for contact separation.

These as well as other objects of this invention shall become readily apparent after reading the following description of the accompanying drawings in which:

FIGURES 1–3 are side elevations of a circuit breaker constructed in accordance with the teachings of the instant invention, with the cover of the casing removed to reveal the operating mechanism. In FIGURE 1 the circuit breaker is in the On position, in FIGURE 2 the circuit breaker is in the manual Off position, and in FIGURE 3 the circuit breaker is in the Tripped position.

FIGURE 1A is a fragmentary cross-section of the circuit breaker housing taken through line 1A—1A of FIGURE 1 looking in the direction of arrows 1A—1A.

FIGURE 4 is an exploded perspective of the circuit breaker operating mechanism.

FIGURE 5 is a side elevation of the cradle sub-assembly.

FIGURES 5A and 5B are cross-sections taken through lines 5A—5A and 5B—5B, respectively, of FIGURE 5, looking in the direction of the respective arrows.

FIGURE 6 is an end view of the contact arm.

FIGURE 7 is a fragmentary side elevation of the cradle in the region of the joint between the contact arm and the cradle.

FIGURES 8 and 9 are fragmentary side elevations showing the relationship between the contact arm and cradle in the joint region. In FIGURE 8 the contact arm is in normal operating position, while in FIGURE 9 the contact arm has been moved to the position it occupies relative to the cradle when contact welds are present during automatic tripping.

Now referring to the figures, circuit breaker **20** includes a housing comprised of a case **21** and cover **22** mated to each other along line **23** and secured by rivets **23***a*. The current path through circuit breaker **20** comprises line terminal **24**, conducting strap **25**, stationary contact **26**, movable contact **27**, contact arm **28**, the pressure joint **29** at the upper end of contact **28**, releasable cradle **30**, bimetal **31**, conducting braid **32**, load terminal member **33**, and load terminal **79**.

Adapter means **77**, of a type fully described in the J. H. Leonard copending application Serial No. 18,411, filed March 29, 1960, entitled "Panelboard Adapter," and assigned to the assignee of the instant invention is utilized to electrically connect line terminal **24** to a panelboard bus bar (not shown).

Circuit breaker **20** includes an operating member **34** having an extension **35** which extends upwardly through an opening **36** in the top of housing **21**, **22** to provide a manual operating handle. Operating member **34** is also provided with an arcuate portion **37** extending in the direction of movement of handle **35** and disposed within arc groove **38** of case **21** and a similar groove in cover **22**. The upper end of handle arm **39** extends into suitable recesses of operating member **34** while the lower end of arm **39** abuts against a rounded internal formation of case **21** to form a pivot **40** for operating member **34**.

Main operating spring **41** is secured at one end thereof **42** to arm **39** where the upper end thereof engages member **34** while the other end **43** of spring **41** is connected to movable contact arm **28**. Spring **41** is a tension spring comprised of an open loop with elongated arms extending in opposite directions. The tension force exerted by spring **41** urges the upper end of contact arm **28** to abut cradle **30** at joint **29**.

With sub-assembly **100** (FIGURE 5) in the latched position of FIGURES 1 and 2, circuit breaker **20** may be operated manually between the On and Off positions. When handle **35** is moved to the right with respect to FIGURE 1 at such time as the spring end at **42** passes to the right of a line joining spring end **43** and joint **29**, the line of action of spring **41** will be so positioned as to affect a snap opening of contacts **26**, **27** by pivoting contact arm **28** in a counterclockwise direction about joint **29** to the Off position of FIGURE 2. The reverse action takes place as handle **35** is moved to the left with respect to FIGURE 2. During this operation, at such time as the line of action of spring **41** extending between spring ends **42**, **43** passes to the left of the line joining spring end **43** and joint **29** in FIGURE 2, contact arm **28** will be snapped in a clockwise direction about joint **29** to the closed position of FIGURE 1.

Sub-assembly **100** (FIGURE 5) comprises cradle **30** which is a generally V-shaped member having an opening **44** near the apex thereof which receives a case embossment **45** serving as a pivot for sub-assembly **100**. Bimetal **31**, which forms a part of sub-assembly **100**, is fixedly secured at one end **46** thereof as by welding to



cradle leg **47** in the region of aperture **44**. Sub-assembly **100** further comprises intermediate latch member **48** pivotally mounted at pin **49** to the offset portion **30***a* at the free end of cradle leg **40**. In forming portion **30***a* stop formation **71** is also formed. Stop **71** cooperates with the notch **72** in latch member **48** to limit movement of latch member **48** about its pivot pin **49**. Pin **49** is constructed of insulating material as is sheet **70** which is interposed between latch member **48** and cradle offset portion **30***a*. Thus, latch member **48** is insulated from cradle **30**.

Pin **49** and latch member **48** are secured to cradle **30** by element **90** which is constructed of a good electrically conductive spring material. Element **90** is an elongated member having a U-shaped portion **91** at one end and at the other end an offset portion **92** with an open ended slot **93**.

The arm **94** of U-shaped portion **91**, which is not directly connected to the main portion **95** of element **90**, confronts one surface of main portion **95** while portion **92** is offset beyond the other surface of main portion **95**. The web of U-shaped portion **91** is disposed within cradle notch **96** with the upper end of contact arm **28** being positioned between the arms of the U-shaped portion **91** which encompass the region of joint **29** to provide guidance for arm **28** as it moves between the positions of FIGURES 1–3. The arms of U-shaped portion **91** are slightly spread as a result of engagement with embossments **97A**, **97B** (FIGURE 6) extending from opposite surfaces of contact arm for a purpose to be hereinafter explained.

The portion of element **90** defining slot **93** is received by annular groove **98** in the body of pivot pin **49** to retain pin **49** mounted to cradle **30**. As slot **93** is mated to pin **49** the main portion **95** snaps over cradle projection **88** to retain element **90** mounted to cradle **30**. Thus, it is seen that elements **30**, **48**, **49**, **70** and **90** are readily assembled without the necessity of utilizing special deforming tools or assembly jigs.

Offset portion **30***a* must be bent from its free position in order for slot **93** to receive the reduced portion of pin **49**. In so being bent, the main portion **95** is firmly seated against cradle **30** and intermediate latch **48** is biased axially along pin **49** toward cradle offset portion **30***a*. This assures a uniform latch bite for successive resettings after thermal tripping. The rounded portion **99** at the end of pin **49** opposite its enlarged head **89** serves to align sub-assembly **100** with respect to the internal walls of housing **21**, **22**.

Since contact arm **28** abuts cradle **30** at joint **29** to the right of embossment **45**, the force exerted by main operating spring **41** acts to rotate sub-assembly **100** counterclockwise about pivot **45**. However, sub-assembly **100** is restrained against movement in a counterclockwise direction through the engagement of intermediate latch member **48** with main latch member **51**. Main latch member **51** is comprised of spring material and includes a portion of reduced area which extends over the back of magnet **52** so as to form a pivot at **53** for armature **54** which is secured to main latch member **51** by welding.

Magnet **52** is of generally U-shaped cross-section with terminal member **33** passing between the arms of the U to form the energizing turn therefor. The biasing action of the spring material forming main latch member **51** urges armature **54** in a clockwise direction about its pivot **53** away from magnet **52**. The lower end of armature **54** abuts a case formation **56** to establish the air gap between armature **54** and magnet **52** and also establishes the latching position for member **51**. Magnetic tripping takes place when a predetermined magnitude of current flows through terminal member **33** causing magnet **52** to generate flux which attracts armature **54** counterclockwise about pivot **53**. This moves main latch member **51** with respect to FIGURE 1 so that

sub-assembly **100** is no longer restrained. Thus, sub-assembly **100** under the influence of main operating spring **41** rotates in a counterclockwise direction about pivot **45**. When pivot **29** moves to the left of the line of action of spring **41** in its position of FIGURE 1, spring **41** will urge contact arm **28** in a counterclockwise direction about pivot **29** to bring about a snap opening of contacts **26, 27**.

The circuit breaker elements are now in the tripped position of FIGURE 3 with sub-assembly **100** being positioned by the abutment of case embossment **55** and cradle surface **55***a* while one side of contact arm offset **75** abuts cover formation **76**. Offset **75** extends at right angles to the plane of movement of contact arm **28** and movable contact **27** is mounted to the other side of offset **75**.

After magnetic tripping, resetting is accomplished by moving operating handle **35** to the extreme right position from the intermediate tripped position of FIGURE 3. During this movement handle arm extension **60** engages cradle **30** along surface **61** so that sub-assembly **100** is moved clockwise against the force of spring **41** to the latched position of FIGURE 2. As latch member **48** moves past latch member **51** the rounded portion **63** of intermediate latch member **48** cams latch **51** to the right until latch surface **64** passes below the lower end of main latch member **51**.

Time delay tripping is accomplished by a deflection of the free end of bimetal **31** out of the plane of movement of cradle **30**. When this deflection is sufficient to free bimetal offset tip **31***a* from intermediate latch **48** the action of tension spring **41** will rotate cradle **30** in a counterclockwise direction about pivot **45**. Initially intermediate latch member **48** is retained by main latch member **51** so that there is relative movement between cradle **30** and intermediate latch member **48** about pivot **49**. As the distance between pivot **49** and main latch member **51** increases, a point is reached where intermediate latch member **48** is free of main latch member **51** and the sub-assembly **100** moves freely to the tripped position of FIGURE 3. It is to be noted that bimetal tip **31***a* presents a rolled surface for engagement by latch member **48** so that shear forces are materially reduced and successive trip operations are more uniform.

Resetting after thermal tripping is accomplished by moving handle **35** from the intermediate trip position of FIGURE 3 to the extreme right position of FIGURE 2. At the latter portion of this movement intermediate latch member **48** engages case embossment **65** which forces intermediate latch member **48** in a counterclockwise direction about its pivot **49** to a point where member **48** is free of the edge of bimetal extension **31***a* and at this time the free end of bimetal **31** moves toward the plane of movement of cradle **30** into latching position.

It is to be noted that as the latch bite between bimetal offset **31***a* and member **48** changes due to a deflection of bimetal **31** the latch bite between surface **64** and member **51** is not affected. Similarly, a change in the magnetic latch bite **64, 51** in no way affects the thermal latch bite **31***a*, **48**. Thus, the thermal and magnetic trips are operated independently of one another.

Cover **22** is mated with case **21** to form housing chamber **80**, wherein the operating mechanism is disposed, also forms vent opening **81** (FIGURE 6) which extends for distance X (FIGURE 1) along the bottom of housing **21, 22**. Vent **81** is greatly elongated, being very narrow in width, say .020". It is to be noted that the cover surface **82** forming vent **81** extends toward vent **81** initially experiencing turbulence within chamber **81** since vent **81** is so narrow. After the gases are substantially deionized the upper portion of surface **82** not confronted by surface **83** acts to direct the deionized gases through vent **81** out of housing **21, 22**.

During movement of contact arm **28** the upper end thereof often loses direct contact with cradle **30** at pressure joint **29**. If there were no parallel conducting paths, arcing would occur at joint **29** which would soon become pitted and thereafter present a high resistance connection. The instant invention provides these parallel conducting paths in the form of spring element **90** whose body portion **95** is self biased against cradle leg **50** and whose U-shaped portion arms are self biased into engagement with contact arm **28** at embossments **97A, 97B**. The engagement between element **90** and embossments **97A, 97B** is maintained even though contact arm **28** moves a considerable distance away from joint **29**.

Embossments **97A, 97B** are formed as spherical segments to reduce the frictional forces between spring element **90** and contact arm **28** which must be overcome in moving contact arm relative to cradle **30**.

In circuit breakers of the type hereinbefore described it is not unusual for the contacts **26, 27** to weld with spring **41** not being of sufficient strength to break these welds. For manual breaking of contact welds handle extension **39** is pivoting clockwise, as handle **35** is moved to the right from its position of FIGURE 1, and engages offset **101** which is depressed from the plane of contact arm **28** (FIGURE 4). Thus, the manual opening force is applied directly to contact arm **28** for breaking of contact welds.

The breaking of contact welds during automatic tripping is facilitated by the unique shapes of cradle **30** and contact arm **28** at the region of joint **29**. This is best explained by reference to FIGURES 7–9.

The legs **47, 50** of cradle **30** are arranged to form notch **102** which receives contact arm **28**. Notch **102** is of generally V-shape, as indicated by the dotted line in FIGURE 7, and is provided at its apex region with an offset reentrant portion **103**. The upper end of contact arm **28**, at the upper end thereof, is provided with a section of reduced width having a rounded portion **104** which is normally entered into reentrant, or first, portion **103** of notch **102** as in FIGURE 8. It is to be noted that rounded portion **104** appears to be comprised of an arc greater than a semi-circle.

During automatic tripping, cradle **30** is unlatched. At this time, its counter clockwise motion about center **45** is relatively unrestrained. Assuming a contact weld, the main spring **41** acting on contact arm **28** acts to move rounded portion **104** out of reentrant notch portion **103**, to the position of FIGURE 9, whereat rounded portion **104** engages a second portion **105** of the notch **102**. Notch surface **105** is so shaped that the relocation of rounded portion **104** thereat serves to exert both a shear force and a bending moment on this weld. Both types of forces are present to act on the weld because:

(1) Vertical translation of contact arm **28** is unrestrained since this would produce a counter clockwise motion of cradle **30** and the cradle **30** is not restrained against a counter clockwise motion.

(2) Rotation of contact arm **28** counter clockwise about the weld, i.e. bending of the weld, is relatively unrestrained since the shape of the cradle notch is such that counter clockwise rotation of contact arm **28** will also produce counter clockwise rotation of cradle **30**, which is unrestrained against motion in this direction.

The bending moment created by the force of spring **41** acting on contact arm **28** acts on the weld greatly increasing the stress at the weld, ultimately breaking the weld.

Thus, this invention provides novel means for contact weld breaking during both manual and automatic operating of a narrow molded case circuit breaker.

Although there has been described preferred embodiments of this invention, many variations and modifications will not be evident to those skilled in the art and, therefore, the scope of this invention is to be limited not by the specific disclosure herein detailed, but only by the appended claims.

I claim:

1. A circuit breaker comprising a pair of cooperating contacts and an operating mechanism for operating said contacts into and out of engagement; said mechanism including a releasable cradle, latch means for restraining said cradle in a reset position, an operating spring urging said cradle to a tripped position, and a manually operable member for operating said contacts into and out of engagement; said mechanism further including a tripping means having a portion operatively positioned for engagement with said latch means and when deflected sufficiently to disengage said latch means permitting said spring to move said cradle to its said trip position wherein said contacts are disengaged; a movable contact arm carrying at one end thereof one of said cooperating contacts and having the other end biased into abutment with said cradle at a first region constructed to provide a pivotal support for said contact arm; said other end and said first region being constructed for cooperation with one another whereby upon movement of said cradle to its said trip position forces are exerted upon said contact arm directed in a direction creating a bending moment which separates said contacts breaking welds which may exist therebetween; said first region comprising a notch including first and second spaced notch portions; said other end having a portion normally disposed within said first notch portion when said first contacts are engaged; the movement of said cradle towards its said trip position, with said contacts being welded, moving at least a part of said contact arm portion from said first notch portion to said second notch portion; the relocation of said contact arm portion in said second notch portion dimensionally related to the location of said welded contacts, and the movement of said cradle member, to generate a force component along said contact arm in a direction aiding in breaking the welded relationship of said contacts.

2. A circuit breaker comprising a pair of cooperating contacts and an operating mechanism for operating said contacts into and out of engagement; said mechanism including a releasable cradle, latch means for restraining said cradle in a reset position, an operating spring urging said cradle to a tripped position, and a manually operable member for operating said contacts into and out of engagement; said mechanism further including a tripping means having a portion operatively positioned for engagement with said latch means and when deflected sufficiently to disengage said latch means permitting said spring to move said cradle to its said trip position wherein said contacts are disengaged; a movable contact arm carrying at one end thereof one of said cooperating contacts and having the other end biased into abutment with said cradle at a first region constructed to provide a pivotal support for said contact arm; said other end and said first region being constructed for cooperation with one another whereby upon movement of said cradle to its said trip position forces are exerted upon said contact arm directed in a direction creating a bending moment which separates said contacts breaking welds which may exist therebetween; said first region comprising a notch including an offset reentrant portion; said contact arm other end having a portion biased to a position where it is normally disposed within said reentrant portion and as said cradle commences movement toward its said trip position at least a part of said contact arm portion normally disposed in said reentrant portion is moved out of said reentrant portion.

3. The circuit breaker as set forth in claim 2 in which said contact arm portion is generally rounded and is comprised of an arc apparently more than a semi-circle.

4. The circuit breaker as set forth in claim 2 in which the notch is generally V-shaped with the reentrant portion disposed at the apex region of the V.

5. The circuit breaker as set forth in claim 4 in which the contact arm is somewhat L-shaped with the arm having the other end being disposed in said generally V-shaped notch.

6. The circuit breaker as set forth in claim 5 in which said contact arm portion is generally rounded and is comprised of an arc apparently more than a semi-circle.

7. A circuit breaker comprising a pair of cooperating contacts and an operating mechanism for operating said contacts into and out of engagement; said mechanism including a releasable cradle, latch means for restraining said cradle in a reset position, an operating spring urging said cradle to a tripped position, and a manually operable member for operating said contacts into and out of engagement; said mechanism further including a tripping means having a portion operatively positioned for engagement with said latch means and when deflected sufficiently to disengage said latch means permitting said spring to move said cradle to its said trip position wherein said contacts are disengaged; a movable contact arm carrying at one end thereof one of said cooperating contacts and having the other end biased into abutment with said cradle at a first region constructed to provide a pivotal support for said contact arm; said other end and said first region being constructed for cooperation with one another whereby upon movement of said cradle to its said trip position forces are exerted upon said contact arm directed in a direction creating a bending moment which separates said contacts breaking welds which may exist therebetween; said first region comprising a notch including first and second spaced notch portions; said other end having a portion normally disposed within said first notch portion when said first contacts are engaged; the movement of said cradle towards its said trip position, with said contacts being welded, moving at least a part of said contact arm portion from said first notch portion to said second notch portion; the relocation of said contact arm portion in said second notch portion dimensionally related to the location of said welded contacts, and the movement of said cradle member, to generate a force component along said contact arm in a direction aiding in breaking the welded relationship of said contacts; said other end being biased into abutment with said cradle by said operating spring.

8. The circuit breaker as set forth in claim 7 in which the operating spring is a tensioned member connected to said contact arm; a manually operable means connected to said spring for changing the relative position of said spring and said contact arm to bring about snap opening and closing of said contacts.

9. The circuit breaker as set forth in claim 7 in which the manually operable means includes a portion engageable with a portion of said contact arm only during manual opening of said contacts to apply a manual opening force directly to said contacts.

10. A circuit breaker comprising a pair of cooperating contacts and an operating mechanism for operating said contacts into and out of engagement; said mechanism including a releasable cradle, latch means for restraining said cradle in a reset position, an operating spring urging said cradle to a tripped position, and a manually operable member for operating said contacts into and out of engagement; said mechanism further including a tripping means having a portion operatively positioned for engagement with said latch means and when deflected sufficiently to disengage said latch means permitting said spring to move said cradle to its said trip position wherein said contacts are disengaged; a movable contact arm carrying at one end thereof one of said cooperating contacts and having the other end biased into abutment with said cradle at a first region constructed to provide a pivotal support for said contact arm; said first region comprising a notch including an offset reentrant portion; said contact arm other end having a portion biased to a position where it is normally disposed within said reentrant portion and as said cradle commences movement toward its said trip position at

least a part of said contact arm portion normally disposed in said reentrant portion is moved out of said reentrant portion; said notch being partially defined by a surface adjacent to said reentrant portion; said surface being engaged by said contact arm other end as it moves out of said reentrant portion; said surface being operatively positioned to direct a component of force produced by the operating spring against said contact arm whereby as said contact arm other end leaves said reentrant portion and a bending moment is created which separates said contacts breaking welds which may exist therebetween.



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