July 21, 1964 R. J. DEW 3,141,941

CURRENT RESPONSIVE CIRCUIT BREAKER

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FIG. 3.

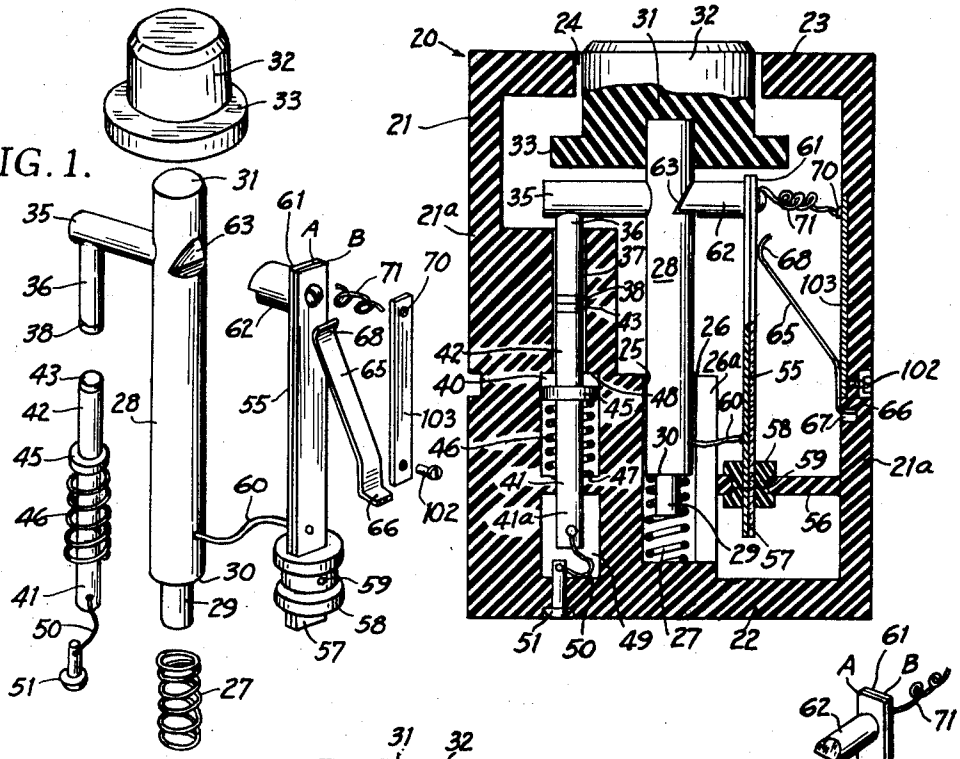

FIG. 1.

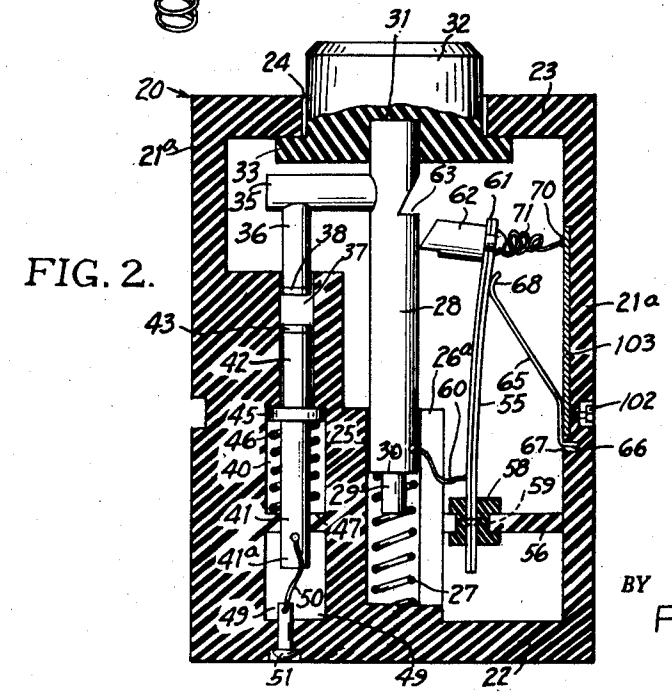

FIG. 2.

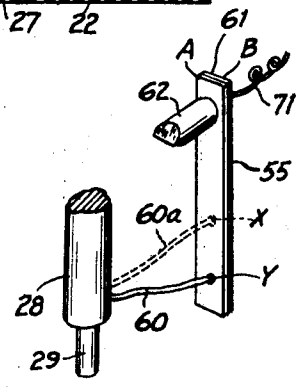

FIG. 8.

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FIG. 5.

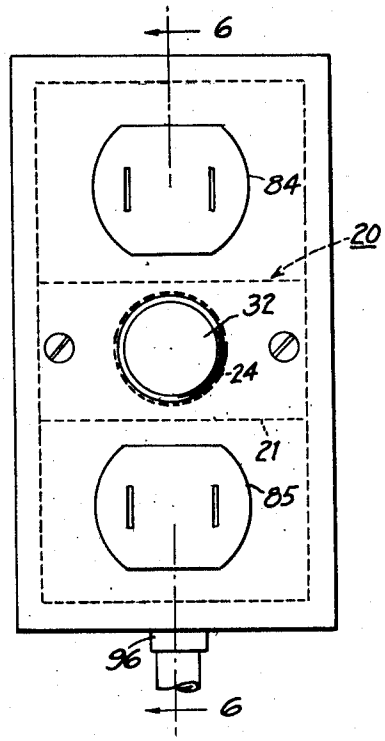


FIG. 6.

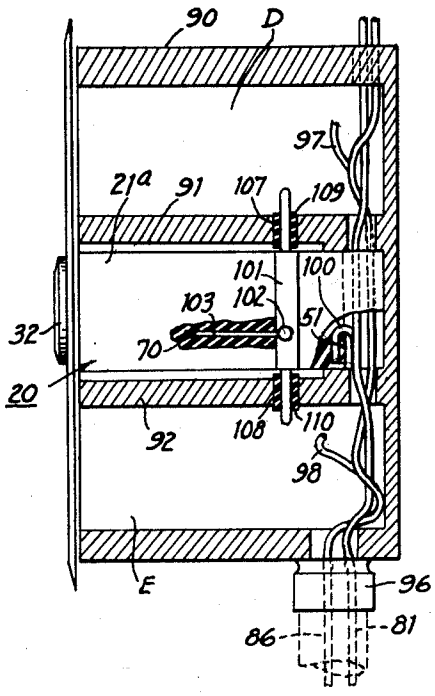


FIG. 4.

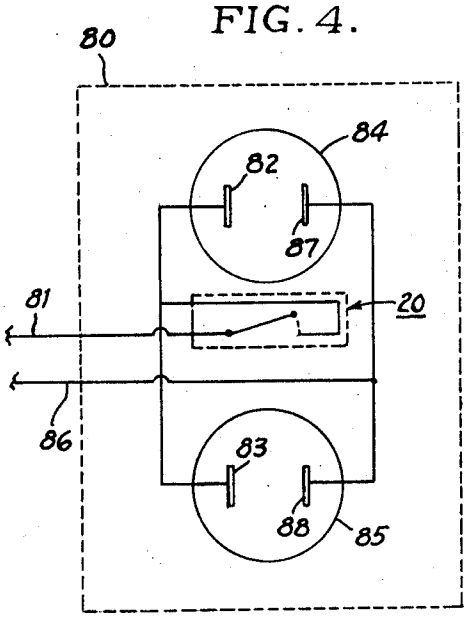
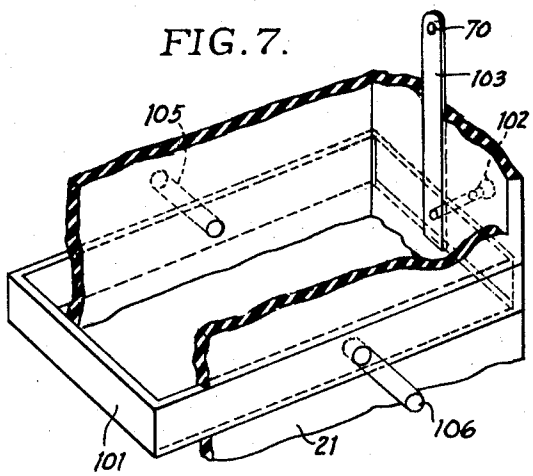


FIG. 7.



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CURRENT RESPONSIVE CIRCUIT BREAKER

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11 Claims. (Cl. 200—116)

This invention relates generally to circuit breakers, and in particular, to the construction of a mechanism of an electrical circuit breaker by which an electrical circuit may be broken due to an overload of current therein.

An object of this invention is to provide for a compact circuit breaker which is simplified in construction and reduced in the number of parts required over prior circuit breakers, but nevertheless remains a highly efficient safety appliance during operation, being limited only by practical size for its use and by the complexity that arises in circuit breaker constructions for extremely high voltage operation.

A further object of this invention is to provide for immediate access to the point in a circuit where overload of current occurs, and thereby rectify the cause for such overload while at the same time, automatically resetting the circuit for renewed and safe operation.

Another object of this invention is to provide for a resettable circuit breaker which is an integral part of a single or multiple outlet or the like, thereby removing the necessity, upon overload and blowing or opening of the circuit, of changing fuses at the main electrical box from which the circuit line flows.

Another object of this invention is to provide for a novel and practical overload current breaker through the instrumentality of thermal responsive means which automatically, upon actuation, opens the circuit, cutting off the current to the remainder of the circuit as soon as the incoming current exceeds a predetermined amount.

A further object of this invention is to provide for an improved and advantageous arrangement in a thermally responsive breaker in which an insulating or non-conducting means mounted on a temperature responsive element is utilized to hold the circuit breaker in operating or closed position.

Another object of the invention is to provide for an arrangement of the mechanism parts of the breaker unit in which they move definitely and consistently, and the electrical contact parts thereof move instantaneously apart when a given thermal condition in the temperature responsive element is reached as a result of a current overload.

The usual wiring of an electrical complex, for example, the kind employed in a residence, involves the running of a plurality of pairs of wires from a main fuse box, each pair to an outlet or to a number of wall or other outlets across which loads may be applied through sundry means such as lamps, household appliances, radios, heating blankets, etc.

Many lengths of wire, various gauges of electrical wire, and much labor is required to complete the wiring in the complex. A similar situation exists generally in business houses in which a plurality of lines are run from a main fuse box to different tenants' offices, each pair of lines for an outlet or a number of outlets. In each case, an overload causes a fuse to blow, thereby rendering inoperative not only the particular outlet at which the overload occurs, but perhaps other outlets on the line. In residences, this is an inconvenience, especially at dark, to replace a particularly blown fuse with a fuse requiring a certain current rating. In business houses delay is experienced in awaiting rectification at the main box by an authorized electrician.

A further object of this invention therefore, is to provide for a novel circuit breaker, the use of a plurality

thereof in an electrical complex reducing the amount of labor and materials that would otherwise be demanded in the heretofore manner of completing the wiring in such a complex. A single pair of wires leading to a particular outlet which incorporates the novel circuit breaker would be extended to each and every other outlet incorporating another such novel breaker, some of which other outlets were imposed on other sets of pairs of wires, in the heretofore mentioned known or conventional wiring system. Thus, but one pair of wires is required for a complex which includes this novel circuit breaker, and reduction in labor and materials is realized in the use and installation of same in the complex, while nevertheless, retaining the result of being able to use any one of the outlets as had heretofore been chosen to be used for a particular purpose.

These and other objects and a full and complete understanding of the invention may be had by referring to the following description and appended claims thereto, taken in conjunction with the accompanying illustrative drawing in which reference characters therein coincide with those in the description.

In the drawing:

FIG. 1 is an exploded perspective view of component parts of the mechanism housed in the circuit breaker;

FIG. 2 is a vertical section of the circuit breaker in open or "break" position;

FIG. 3 is a vertical section of the circuit breaker in closed or "make" position;

FIG. 4 is a schematic diagram illustrating an electrical circuitry incorporating the invention;

FIG. 5 is a front elevational view of a double outlet wall plug with breaker incorporated therein;

FIG. 6 is a sectional view taken on line **6**—**6** of FIG. 5;

FIG. 7 is a fragmentary perspective view of part of the circuit breaker illustrating particular means by which it may be incorporated into the wall outlet of FIG. 6; and

FIG. 8 is a perspective view of a modification of part of the mechanism of the circuit breaker.

Having reference to the drawings, in particular to FIGS. 1, 2, and 3, the reference character **20** identifies the circuit breaker generally. A housing **21** houses the component parts of the circuit breaker. Housing **21** is made of a suitable insulating material and in the immediate illustration of the invention, is constructed in the form of a rectangular mold. It comprises a base **22** and walls **21***a* extending therefrom which are connected to a face **23** at the front of the housing. It also preferably provides therein for particular wells, spacings and chambers required for the mounting and the support of component parts of the actuating mechanism housed therein, as will be evident from the hereinafter description. Centrally located in face **23** of housing **21** is a circular aperture **24** which opens into the interior of the housing and opposite which a vertical bore **25** is centrally disposed. More **25** is formed by means of a cylindrical insulating skirt **26** integrally extending upwardly from base **22** of housing **21** and is sufficiently deep in order to support therein a helical spring **27** on which a vertically positioned or disposed elongated sliding conducting breaker bar **28** is mounted. As shown in FIG. 2, the entire length of bar **28** is of conducting material and thereby capable of conducting current throughout its length or portion thereof through which it is necessary that current be conducted. A reduced portion **29** is formed along the lower end of bar **28**, and is received within the helical spring **27** seated on the bottom of bore **25**. A peripheral shoulder **30** is thus provided on breaker bar **28** by which spring **27** urges bar **28** constantly upwardly or forwardly of the housing. Breaker bar **28** extends upwardly and centrally of housing **21** to terminate

at its other end 31 inserted and suitably fixedly secured in the base of a reset button 32 adapted to reciprocate through aperture 24. Thus, breaker bar 28 is reciprocable within housing 21 by means of button 32 and is in its "make" position when spring 27 is compressed by positioning the outward face of button 32 substantially flush against the exterior wall or face 23 of housing 21 shown in FIG. 3. Breaker bar 28 is in its released or "break" position when an annular arresting stop 33 integrally mounted on the rear of reset button 32 engages the inside of face 23 after action of spring 27 has urged bar 28 forwardly, as shown in FIG. 2.

Protruding from a portion of the elongated cylindrical surface of bar 28 above bore 25, preferably adjacent reset button 32, is an integral extension or arm 35 which extends towards one of the walls 21*a* of housing 21 and from which a downwardly cast finger 36 depends. Finger 36 depends over a vertical well 37 formed in housing 21, and constitutes an electrical contact, however, it is preferable that at the end of finger 36, an electrical contact 38 is provided. It is clear that contact 38 is movable with breaker bar 28 as the latter reciprocates between its make position and its break or released position, regardless of where arm 35 may be located along the length of bar 28.

An enlarged chamber 40 is provided in housing 21 directly below well 37. Chamber 40 accommodates a substantially stationary conducting member 41. The upper end 42 of member 41 extends into and is carried in well 37, and is preferably provided with an electrical contact 43 thereon.

Contact 43 is mounted for positive registry with contact 38 when breaker bar 28 is in its "make" position. Member 41 is substantially a fixed electrical conducting element in housing 21, however, means to assure positive registry of contacts 38 and 43 is provided in the instant embodiment illustrated by FIGS. 2 and 3. An annular flange 45 is integrally formed on member 41 substantially along the middle portion thereof, and a helical spring 46 is mounted on a seat 47 provided for enlarged chamber 40. Spring 46 is adapted to co-act with flange 45 urging the latter upwardly towards a shoulder 48 (FIG. 3) formed between well 37 and chamber 40. As finger 36 is depressed into well 37, contact 38 registers upon contact 43 which is urgingly held against the former by spring 46, thereby assuring positive engagement of the contacts. The lower portion 41*a* of member 41 is adapted to extend through an aperture in seat 47 into a second chamber 49 formed below seat 47 and which is adjacent the base 22 of housing 21 whereby connecting means or jumper wire 50 fused or otherwise joined to portion 41*a* connects conductor 41 to a screw 51 or other conventional means mounted in base 22. Screw 51 functions as one of the terminals of the circuit breaker by which it is wired into a circuit.

A thermo-responsive element 55 is vertically disposed and mounted in housing 21. In its normal position it is parallel to and adjacent breaker bar 28. Its lower end 57 is elevated from base 22 and is rigidly connected to an insulated flange or seat 56 preferably integrally formed between a lower portion of skirt 26 and a wall 21*a*. End 57 is inserted through a rubber grommet 58 after which a pin 59 secures such end to the latter. Grommet 58 is thence mounted and fixedly secured to flange 56.

Element or bimetallic strip 55 is composed of two conducting metals A and B (FIG. 1), each being of the same length as the other in housing 21, and each having a thermal coefficient of expansion different from the other. Conductors A and B are fused or otherwise joined together along their lengths to form the single strip or element 55 which conducts current in the operation of the circuit breaker. Conductor A has the higher of the two coefficients of expansion in order for the thermo-responsive element 55 to deflect or curve away from breaker bar 28 upon a rise in thermal temperature of the circuit current. Conductor A will lengthen at a quicker rate than conductor B, and will tend to bend around the latter since both are welded, fused or otherwise joined together. Means to conduct current between bar 28 and element 55 is provided by a jumper wire 60 fastened between these two parts, preferably by welding. An elongated slit 26*a*, is provided in skirt 26 adjacent element 55 in order that jumper wire 60 may readily extend between bar 28 and element 55.

At the upper end 61 of element 55, an insulating or non-conducting pawl 62 is rigidly secured thereto, extending preferably at a right angle towards slider bar 28, and is adapted to engage a recess 63 formed in bar 28 when element 55 is in its normal upright position. Such pawl 62 and recess 63 constitute an interlocking means by which breaker bar 28 is held in its make position during current flow through the device.

Means in the nature of a leaf spring 65, preferably non-conducting in nature, is provided to position or bias bimetallic strip 55 in its normal upright or straight position. Its one end 66 is hooked into a slot 67 formed in the interior or cylindrical surface of wall 21*a* of housing 21, while its length is substantially bent inwardly away from wall 21*a*. Its other end is formed into a curl 68 adapted to engage and bias element 55 uprightly, as clearly illustrated in FIG. 3. The insulated end of pawl 62 thus will normally be held in a position of engagement with recess 63 in bar 28 when reset button 32 is pushed in. Simultaneously, contact 38 registers with stationary contact 43, making a positive engagement therewith as annular flange 45 moves off shoulder 48 and against the compression of helical spring 46.

As it was in regard to member 41, element 55 is adapted to be connected to a terminal 70, as seen in FIGS. 1, 2 and 3, which terminal is mounted on the interior of housing 21, adjacent the position of leaf spring 65. Such a connection is provided by means of a jumper wire 71 which is fused, welded, or otherwise joined to and between element 55 and terminal 70.

In operation the path of the current is reversible through the unit, and this should be understood although the following explanation pertains merely to one direction of the path. Current passes from terminal 51 across jump wire 50 to fixed contact 41, its contact 43 and thence to slider bar 28 by means of movable contact 38, finger 36, and arm 35. Jumper wire 60 continues to carry the current to thermo-response element 55, across jumper wire 71 to terminal 70. As the current rises, the heat of the conductors A and B increases their respective lengths. Being made of different conducting substances, each conductor A, B has a different rate of lineal expansion. Thus, A lengthens more quickly than B, and as the result of this, as the temperature differential due to the rise in current increases, element 55 arcs away from its normally biased upright position, against the action of spring leaf 65, pulling insulating pawl or latch 62 out of engagement with recess 63. Latch 62 is completely free from recess 63 only upon attainment of a current maximum for which breaker 20 is designed. Conductors A and B, the particular length of the conductors A and B through which current is to pass, the length of the pawl engaging recess 63, the distance that separates element 55 in its upright position from bar 28, and the biasing force of spring 65 are so chosen in the design of breaker 20 that element 55 will arc a specified distance at such maximum attainment, which distance clears latch 62 from recess 63. At this instance of time, breaker bar 28 is reciprocated upwardly or forwardly by the action of spring 27, thereby breaking electrical engagement of complementary contacts 38, 43, thereby opening the circuit. Upon correction of the trouble which caused the break (an overload of current demand on the circuit, for example) reset button 32 is pushed inwardly until latch 62 engages recess 63, and which latch is once again biased in such position by means of leaf spring 65. The circuit is again closed.

A manner in which circuit breaker 20 may be electri-

cally incorporated into a double female wall outlet **80** is schematically illustrated in FIG. 4. The circuit breaker **20** is placed in series in the hot line **81** of the circuit. Positive line **81** is thence continued in parallel to each of prongs **82**, **83** of female plugs **84**, **85**, respectively, as is usually the case in wiring such type of wall outlet. The ground line **86** is connected in parallel directly to the other prongs **87**, **88** of each plug **84**, **85** respectively. It is clear that breaker **20** may be inserted in series in ground line **86** in the same general fashion as was done in hot line **81**, and be as efficiently operable, however, the unnecessary risk of electrocution of an individual would result, and same is not recommended.

FIGS. 5, 6, and 7 illustrate generally one manner of physical incorporation of the device in a wall outlet receptacle **90**. Receptacle **90** is of the usual type used in wall outlets, however, it may be modified in a suitable manner by which housing **21** may be mounted or secured therein and insulated with respect to the outlet's structural configuration. Thus, walls **21***a* of housing **21** are preferably that of a material having high insulating characteristics.

Housing **21** is inserted between upright walls **91**, **92** formed in outlet **90** and which separate areas D, E, from breaker **20**. Insulated circuit wires **81**, **86** are fed into outlet **90** through the usual type conduit **96**, along one side of the outlet, and passes through such outlet along its base to its other side, whence they are continued to another receptacle or load on the electrical line. As wires **81**, **86** pass through each area D, E, in which areas plugs **84**, **85** (not shown in FIG. 6), respectively, are suitably mounted, ground line **86** is attached to prongs **87**, **88**, respectively, by means of supplemental lead wires **97**, **98**, respectively. A supplemental lead wire **100** from wire **81** is attached to terminal **51** of breaker **20** by which the latter is included in the immediate circuit.

Means is provided for breaker **20** by which its terminal **70** is connected to the positive prongs **82**, **83** in parallel. In FIGS. 6 and 7, a band **101** is mounted about the walls of housing **21** along one wall of which screw or bolt **102** is threaded through band **101** and the wall of the housing to make contact with a brass strip **103** that is vertically mounted in the interior of the wall of housing **21**. The other end of brass strip **103** constitutes terminal **70** of breaker **20** in this instance.

Conducting rods **105**, **106**, are each screwed into opposite sides of conducting band **101**, as is shown in FIG. 7, and are inserted through apertures **107**, **108**, which are mounted in respective walls **91**, **92**. The ends of rods **105**, **106** are adapted to be connected or attached to positive prongs **82**, **83** of plugs **84**, **85**, respectively, thereby completing the immediate circuit to the wall outlets. Insulating grommets **109**, **110**, may be provided for rods **105**, **106**, respectively as they pass through their respective walls **91**, **92**.

Although FIGS. 5, 6, and 7 illustrate one incorporation of the invention generally into a double female wall outlet, the invention is not limited thereto. For example, the terminals **51**, **70** of breaker **20** may be located in other more advantageous positions for series inclusion of the breaker in and for a different environment than that of an outlet receptacle such as **90**.

It should now be apparent that an advantage of the use of breaker **20** is that it provides a substantial savings in labor, wiring, and materials that would be otherwise required in installation. For example, rather than running a plurality of pairs of circuit wires from the box main to each receptacle or receptacles through which a rated current is to flow, a single pair of wires such as **81**, **86** may be linked between the main and all outlet receptacles that are to be used regardless of the rated current for any one particular outlet receptacle. The rated current for each receptacle is determined essentially by the kind of bimetallic element used and the point at which jumper wire **60** is attached thereto. Secondly, the circuit is

opened at the point of overload, which may be remedied at such point rather than determining what fuse has blown at the box main.

FIG. 8 illustrates a number of various current maximums which may be determined and used on a single thermo-responsive element incorporated into circuit breaker **20**, depending on what maximum is desired. Should a large maximum current be desired, a jumper wire **60***a* from breaker bar **28**, may be welded to a point X on thermo-responsive element **55**, as compared to jumper wire **60** welded to element **55** at a point Y. Since a shorter length of element **55** is used in the case of jumper wire **60***a* in the operation of the unit, the total length of expansion is smaller for the same differential in temperature that occurs in the case where the same current would be conducted through jumper wire **60** to point Y. Therefore, element **55** arcs a lesser degree from point X than from point Y for the same current. A greater current, then, is required for element **55** to arc the same distance from point X as is required with a lesser current from point Y, in order to free insulating means **62** completely from recess **63** in breaker bar **28**. Bimetallic strip **55** is thus capable of being calibrated for a particularly designed circuit breaker **20** by means of a jumper wire **60** that connects a point along bar **28** to a point along element **55** thereby controlling the effective length of element **55** and calibrate it in so doing.

Pursuant to the requirements of the patent statutes, the principle of this invention has been explained and exemplified in a manner so that it can be readily practiced by those skilled in the art, such exemplification including what is considered to represent the best embodiment of the invention. However, it should be clearly understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described and exemplified herein, by those skilled in the art, and having the benefit of this disclosure.

That which is claimed as patentably novel is:

1. A mechanism for a circuit breaker mounted in a housing having terminals comprising in combination,
   - a vertically disposed reciprocable conducting breaker bar having substantially its entire length capable of conducting current,
   - a pair of electrical contacts one of which is electrically connected to reciprocate with said bar and the other being substantially fixed and connected to a terminal on the housing,
   - said contacts in registry in the make position of the breaker mechanism,
   - a bimetallic element one end of which is insulatedly secured in said housing,
   - non-conducting means mounted on the other end of said bimetallic element, said non-conducting means capable of locking said bar in one position whereby said electrical contacts register with each other,
   - a first conducting means connecting said conducting breaker bar to a point along the length of said element for controlling the effective length thereof, and a second conducting means connecting said other end of said element to the other terminal in said housing, whereby current is capable of flowing through said mechanism between its terminals, and means urging said breaker bar and the one contact reciprocable therewith to open position upon deflection of said bimetallic element and non-conducting means from said bar upon a predetermined current flowing through said element, the deflection of said non-conducting means unlocking said bar for reciprocation from its one position, thereby disengaging said contacts and interrupting flow of current through said mechanism.

2. A circuit breaker comprising in combination, a housing having terminals mounted therein, a vertically disposed reciprocable conducting breaker bar having substantially its entire length capable of conducting current

mounted in said housing, said bar being normally locked in the make position of the circuit breaker, a conducting extension extending from said breaker bar and having depending therefrom an electrical contact reciprocable with said breaker bar, a substantially fixed electrical contact mounted in said housing and connected to one of said terminals, said fixed contact below and in alignment with said electrical contact and in registry with said electrical contact when said circuit breaker is in make position, a thermo-responsive bimetallic element in proximity to said breaker bar and having one end thereof insulatedly secured in said housing, non-conducting means mounted on the other end of said element, means in said bar engageable with said non-conducting means the engagement thereof constituting inter-locking means for said bar and element in the make position of said circuit breaker, means mounted on said housing biasing said element into its normal position whereby the interlocking means is engaged, a first means to conduct current attached between said bar and element for controlling the effective length of said element, a second means to conduct current attached from the end of said element on which said non-conducting means is mounted to the other terminal on said housing, means actuating said reciprocable bar to its break position, and means to reset said breaker bar in make position after said element cools from the heat of current passing therethrough between said first and second means to conduct current.

3. A circuit breaker comprising in combination, a housing having terminals mounted thereon, a vertically disposed reciprocable conducting breaker bar having substanially its entire length capable of conducting current mounted in said housing, a pair of electrical contacts one of which is electrically connected to and reciprocable with said breaker bar, and the other being substantially fixed in and connected to one of said terminals on said housing, said contacts in registry in the make position of the circuit breaker, a bimetallic element one end of which is insulatedly secured in said housing, non-conducting means mounted on the other end of said element constituting locking means by which said bar is locked when the circuit breaker is in its make position, means on said breaker bar engageable with said non-conducting means and engaging same when the circuit breaker is in its make position, first means to conduct current attached between said element and breaker bar for controlling the effective length of said element, second means to conduct current from the end of said element on which said non-conducting locking means is mounted to the other of said terminals on said housing, whereby upon a predetermined current flowing through said element between said first means to conduct current and second means to conduct current, said element deflects away from said bar thereby unlocking said element from said bar which is thereafter capable of reciprocating said contacts out of registry.

4. A circuit breaker comprising in combination, a housing having terminals mounted thereon, a vertically disposed reciprocable conducting breaker bar having substantially its entire length capable of conducting current mounted in said housing, a pair of electrical contacts one of which is electrically connected to and reciprocable with said breaker bar, and the other being substantially fixed in and connected to one of siad terminals on said housing, said contacts in registry in the make position of the circuit breaker, a bimetallic element one end of which is insulatedly secured in said housing, non-conducting means mounted on the other end of said element constituting locking means by which said bar is locked when the circuit breaker is in its make position, means on said breaker bar engageable with said non-conducting means and engaging same when the circuit breaker is in its make position, means mounted in said housing biasing said element into locking engagement with said breaker bar, means for said bar urging same to reciprocate said contacts out of registry upon the unlocking of said bar and non-conducting means, first means to conduct current attached between said element and breaker bar for controlling the effective length of said element, second means to conduct current from the end of said element on which said non-conducting locking means is mounted to the other of said terminals on said housing, whereby upon a predetermined current flowing through said element between said first means to conduct current and second means to conduct current, said element deflects away from said bar against the action of said biasing means thereby unlocking said element from said bar which is thereafter capable of reciprocating said contacts out of registry.

5. A circuit breaker comprising in combination,

(1) a housing having terminals mounted thereon,

(2) a vertically disposed reciprocable conducting breaker bar having substantially its entire length capable of conducting current mounted and supported in said housing,

(3) a conducting extension extending from said bar,

(4) a pair of electrical contacts one of which is electrically attached to and depending from said extension and reciprocable with said bar and the other being substantially fixed in and connected to one of said terminals on said housing, said contacts in registry in the make position of said circuit breaker,

(5) a thermo-responsive bimetallic element one end of which is insulatedly secured in said housing,

(6) non-conducting means mounted on the other end of said element,

(7) means in said bar engageable with said non-conducting means the engagement thereof constituting inter-locking means for said bar and element in the make position of said circuit breaker,

(8) means in said housing biasing said element towards such engagement,

(9) a first means to conduct current attached between said element and bar for controlling the effective length of said element,

(10) a second means to conduct current from the end of said element on which said non-conducting means is mounted to the other of said terminals on said housing, and

(11) means to break the circuit and adapted to reciprocate said breaker bar and reciprocable contact therewith by which said contacts move out of registry upon deflection of said element from said bar upon the increase of current through said element, said means to break the circuit being actuated upon release of said interlocking means.

6. The circuit breaker of claim 5 in which said biasing means comprises a leaf spring mounted to said housing and engaging said element.

7. A circuit breaker comprising a housing having a base, walls extending from said base, a face with which said walls are connected opposite said base, said face having an aperture therein, a skirt defining a bore and being mounted on said base, a well and chamber below such well in said housing, a second chamber below said chamber, a conducting member carried in said well and chambers, a vertically disposed reciprocable conducting breaker bar having substantially its entire length capable of conducting current, said bar having one end thereof being supported in said bore, a conducting arm extending from the other end of said bar to above said well, a finger depending from said arm, said conducting member and finger adapted to register in the make position of the circuit breaker, means to actuate the circuit breaker into make position secured to the other end of said bar and disposed in said aperture, urging means in said bore for urging said bar towards said face, a bimetallic element disposed in proximity to said bar and having one end being insulatedly secured in said housing, a non-conduct-

ing pawl attached to the other end of said element, said bar defining a recess in alignment with said pawl whereby said pawl engages such recess in the make position of the circuit breaker, a leaf spring mounted in one of said walls biasing said element into its normal position in which said pawl engages said recess, means to conduct current between said element and bar for controlling the effective length of said element, and means adapted to connect said conducting member and element to their respective terminals mounted on said housing, whereby upon current exceeding a predetermined amount in said element, said element and pawl thereon deflect away from said bar and recess after which said urging means reciprocates said bar and finger into open position of the circuit breaker.

8. A circuit breaker comprising a housing having a base, walls extending from said base,

a face with which said walls are connected opposite said base and having an aperture therein,

a skirt defining a bore,

a well in said housing,

a conducting member carried in said well,

a conducting reciprocable breaker bar one end thereof being supported in said bore,

a conducting arm extending from the other end of said bar to above said well,

a finger depending from said arm, said conducting member and finger registering in the make position of said circuit breaker,

means to actuate said circuit breaker into make position secured to the other end of said bar and disposed in said aperture,

means in said bore urging said bar towards said face,

a bimetallic element disposed in proximity to said bar and having one end being insulatedly secured to said housing,

a non-conducting pawl attached to the other end of said element,

said bar defining a recess in alignment with said pawl whereby said pawl engages said recess in the make position of the circuit breaker,

means to conduct current attached between said bar and element for controlling the effective length of said element,

and means connecting said conducting member and element to their respective terminals mounted on said housing, whereby upon current exceeding a predetermined amount in said element, said element and pawl deflect away from said bar and recess after which said urging means reciprocates said bar and finger into open position of the circuit breaker.

9. A circuit breaker comprising a housing having a base, walls extending from said base, a face with which said walls are connected opposite said base, said face having an aperture therein, a skirt defining a bore and being located on said base, a well and chamber below such well in said housing, a second chamber below said chamber, a conducting member in said well and chambers and having an electrical contact mounted on its one end in said well, an annular flange on said member located in said chamber, a spring in said chamber urging said flange towards the top of said chamber, a vertically disposed conducting reciprocable breaker bar one end thereof being supported in said bore and having substantially its entire length capable of conducting current, a conducting arm extending from the other end of said bar to above said well, a finger depending from said arm, a second electrical contact on said finger adapted to register with said contact in the make position of the circuit breaker, means to actuate the circuit breaker into make position secured to the other end of said bar and disposed in said aperture, urging means in said bore urging said bar towards said face, a bimetallic element in proximity to said bar and having one end being insulatedly secured

in said housing, a non-conducting pawl attached to the other end of said element, said bar defining a recess in alignment with said pawl whereby said pawl engages such recess in the make position of the circuit breaker, a leaf spring mounted in one of said walls biasing said element into its normal position in which said pawl engages said recess, means to conduct current between said element and bar for controlling the effective length of said element, and means for connecting said conducting member and the pawl end of said element to their respective terminals mounted on said housing whereby upon current exceeding a predetermined amount in said element, said element and pawl thereon deflect away from said bar and recess after which said urging means reciprocates said bar and contact mounted thereon into open position of the circuit breaker.

10. A circuit breaker comprising a housing having a base, walls extending from said base, a face opposite said base and connecting said walls, said face having an aperture therein, a skirt defining a bore and mounted on said base, a well and chamber below such well both formed in said housing, a second chamber below said chamber and adjacent said skirt and base, a conducting member in said well and chambers and having an electrical contact mounted on its one end in said well, an annular flange on said member located in said chamber, a spring in said chamber urging said flange towards the top of said chamber, a vertically disposed conducting reciprocable breaker bar one end being supported in said bore and having substantially its entire length capable of conducting current, a conducting arm protruding from the other end of said bar to above said well, a finger depending from said arm, a second electrical contact on said finger adapted to register with said contact in the make position of the circuit breaker, means to actuate the circuit breaker into make position secured to the other end of said bar and passing through said aperture, urging means in said bore urging said bar towards said face, a bimetallic element normally in parallel proximity to said bar and having one end insulatedly secured in said housing, a non-conducting pawl attached to the other end of said element, said bar defining a recess in alignment with said pawl whereby said pawl engages such recess in the make position of the circuit breaker, a leaf spring mounted in one of said walls biasing said element into its normal position in which said pawl engages said recess, means to conduct current between said element and bar for controlling the effective length of said element, a first terminal in said housing, means to conduct current between said conducting member and said first terminal, a second terminal, means for conducting current between the pawl end of said element and second terminal, a conducting band mounted exteriorly about said housing, means connecting said second terminal and band together, and means mounted on said band adapted to engage a terminal on at least one female plug to which said circuit breaker is connected.

11. In combination, at least one female plug and a circuit breaker comprising, a housing having first and second terminals mounted thereon, a substantially stationary contact mounted in said housing and connected to said first terminal, a vertically disposed electrically-conducting breaker bar reciprocably mounted in said housing, said bar having substantially its entire length capable of conducting current and having a contact mounted on an extension thereof and movable therewith, said contacts in alignment with each other, means for urging said bar forwardly in the housing mounted on said bar, a thermally responsive bimetallic means having one end insulatedly secured in said housing, a non-conducting locking means mounted on the other end of said bimetallic means, means on said bar engageable with said non-conducting locking means, said locking means engaging and locking said means on said bar in biased position against said urging

means thereby maintaining said contacts in positive engagement, a first means to conduct current between said bimetallic means and said breaker bar for controlling the effective length of said bimetallic means, second means to conduct current from the end of said bimetallic means on which said non-conducting locking means is mounted to said second terminal, a conducting band mounted exteriorly about said housing, means connecting said second terminal to said band, and means mounted on said band connected to a terminal on the female plug with which said circuit breaker is in combination.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,141,941 July 21, 1964

Roy J. Dew

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 7, line 64, for "siad" read -- said --; column 10, line 11, after "housing" insert a comma; line 74, strike out "and locking"; column 11, line 4, before "second" insert -- a --.

Signed and sealed this 1st day of December 1964.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents

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