

Oct. 19, 1937.

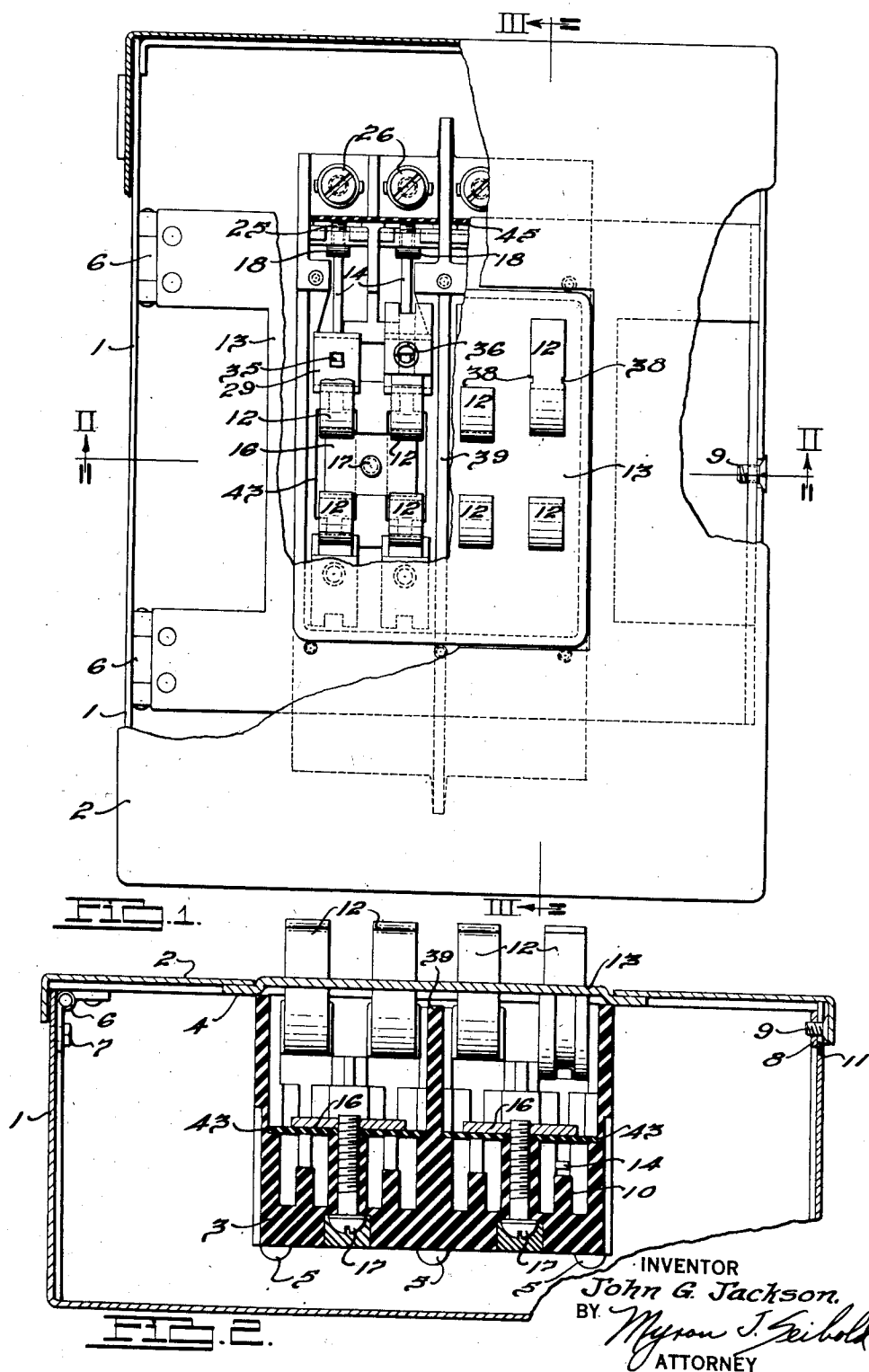
J. G. JACKSON

2,096,547

CIRCUIT BREAKER

Original Filed Aug. 15, 1935

2 Sheets-Sheet 1



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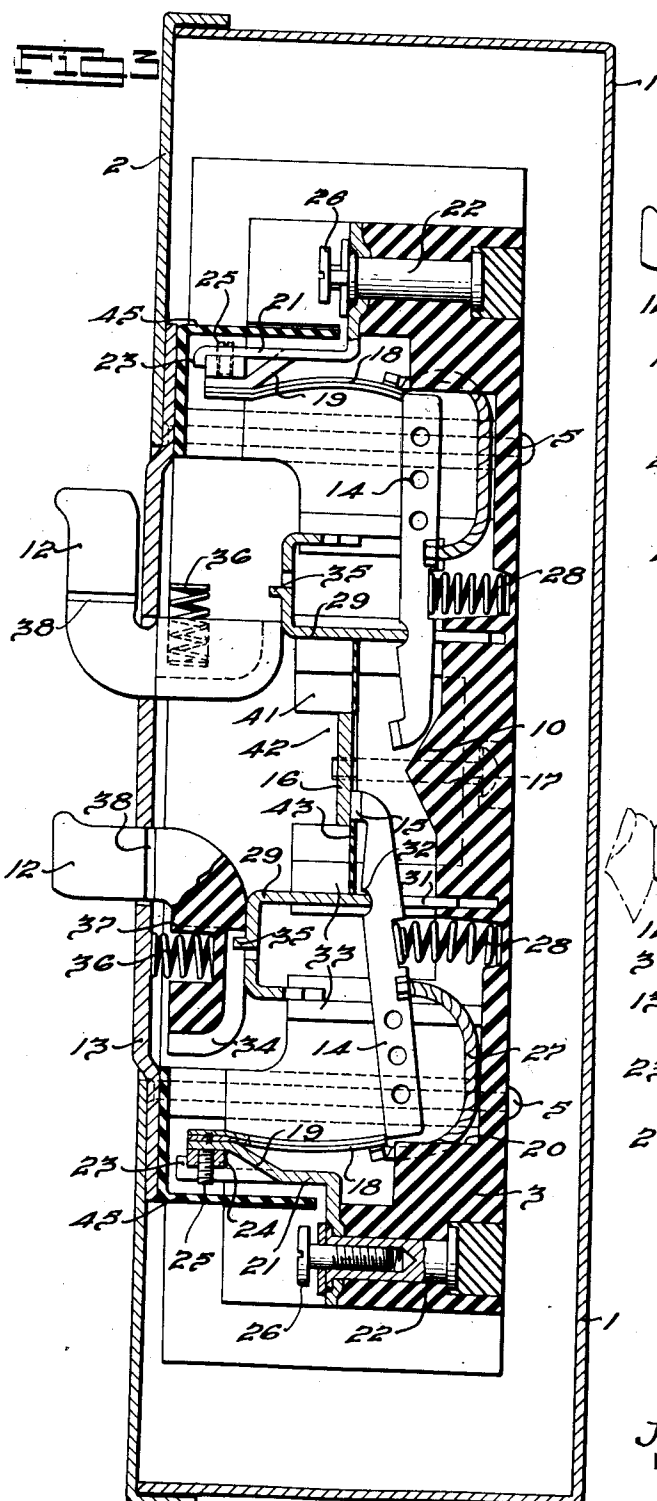
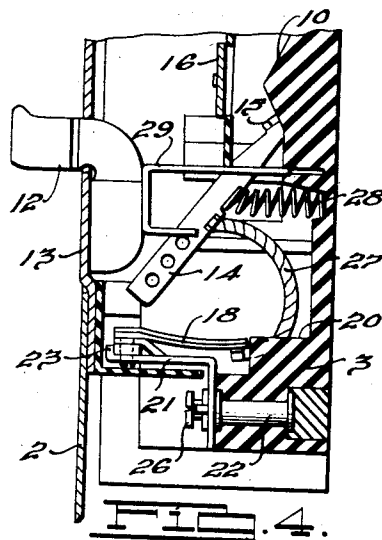
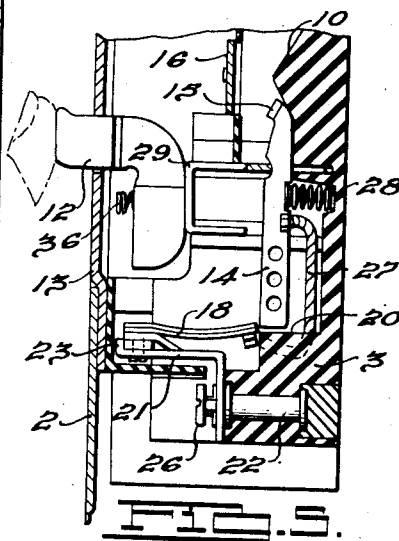
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CIRCUIT BREAKER

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2 Sheets-Sheet 2



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CIRCUIT BREAKER

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Original application August 15, 1935, Serial No.
36,247. Divided and this application June 25,
1936, Serial No. 87,213. Renewed September
10, 1937

8 Claims. (Cl. 200—116)

This invention relates to devices for making and breaking electrical circuits and has for its object the provision of an improved operating means for an automatic electric circuit breaker.

Another object of the present invention is to provide an automatic electric circuit breaker with an operating handle having a rotary movement for normal separation and engagement of the cooperating contacts, a straight line movement to indicate overload tripped condition, and a straight line movement for resetting the breaker mechanism.

Other objects and features of the invention will be readily apparent to those skilled in the art from the following specification and appended drawings illustrating certain preferred embodiments of the invention in which:

Figure 1 is a front elevational view of a circuit breaker according to the present invention with both the exterior cover and the cover of the circuit breaker proper broken away to show internal parts.

Figure 2 is a horizontal sectional view taken on the line II—II of Figure 1.

Figure 3 is a vertical sectional view taken on the line III—III of Figure 1.

Figure 4 is a fragmentary sectional view showing the breaker mechanism in the automatic tripped position.

Figure 5 is a fragmentary sectional view showing the breaker mechanism in the resetting position.

This application is a division of application Serial No. 36,247, filed August 15, 1935, for Circuit breakers.

The circuit breaker illustrated in the drawings comprises an outside enclosing box 1 having a cover 2 hingedly mounted thereon. Within this box is disposed a sealable multi-circuit circuit breaker comprised of an insulating base 3 and a metal cover 4. The cover 4 is adapted to be sealably attached to the base 3 by means of rivets 5. The cover 4 extends across the width of the box and to one side there is riveted or otherwise attached a hinge 6 which is bolted to the side walls of the box as at 7. The opposite side of the metal cover 4 is provided with a flange 8 carrying a bolt 9 adapted to be received within a slot 11 in the box wall to secure the cover 4 and breaker mechanisms within the box 1. The cover 4 is provided with a plurality of openings through which extend the push button handles 12 for operating the breaker mechanisms. The box cover 2 is provided with a generally central opening which closely receives a

slightly raised portion 13 in the cover 4 so that the operating push button handles 12 extend to the box exterior. The hinged mounting of the metal cover 4 permits the circuit breaker to be swung to the exterior of the box to facilitate pulling in and connecting of the circuit wires. To then secure the circuit breaker within the box interior it is swung back to its interior position with the bolt 9 received within the slot 11 whereupon tightening of the bolt 9 will secure the circuit breaker in position.

The individual circuit breaker mechanisms comprise a movable contact bar 14 carrying a contact tip 15 adapted to engage with a common stationary contact 16 which is rigidly secured to the base by means of a bolt 17. The free end of the contact bar 14 is normally latched in the position shown at the bottom of Figure 2 by the bimetallic current responsive member 18. The bimetallic strip 18 is rigidly welded or otherwise secured to an arm 19 centrally punched or otherwise spaced from the main part of a connector 21 which is rigidly secured to the base by means of rivet 22. The side arms thus formed at the end of the connector 21 are bent over as at 23 and within the space formed between the connector 21, the bent-over portions 23 and the arm 19 is disposed a block 24 through which is threaded a stud 25 bearing against the free end of arm 19 and thus serving as an adjusting or calibrating means for the bimetallic strip. Within the rivet 22 is threaded a stud 26 forming the terminal for the breaker. A flexible lead 27 connects the free end of bimetallic strip 18 with the contact bar 14 adjacent to a pivot point thereof to be hereinafter described. The portion of the bar 14 between the lead 27 and the bimetallic strip 18 is provided with holes or otherwise reduced in cross-section to increase its resistance and lessen the current passing directly from the bimetal to the bar through their latching engagement.

A compression spring 28 is provided between the base 3 and the contact bar 14 and acts to bias the bar away from the main body of the base. This spring is located closer to the contact tip 15 than to the latching end of the bar to provide a high contact pressure without unduly increasing the pressure between the bar and the bimetallic latching member.

For operating the contact bar 14 there is provided a generally U-shaped member 29 having legs of different lengths. The longer leg of the member 29 is provided with a slot 31 in which the contact bar is disposed. The upper portion

of the bar within this slot is provided with a notch 32 engaging the end of the slot and serving to restrain the bar from longitudinal movement as well as to provide a pivot point for movement of the bar to automatic trip and reset positions. The short leg of the U-shaped member is also slotted to receive the contact bar in overload position as more particularly shown in Figure 3.

The base 3 is provided with a plurality of upstanding walls 33 provided with slots receiving the bar 14 and with suitable projections for holding and guiding the member 29 in its reciprocal movement.

In front of the operating member 29 is provided an L-shaped push button handle 12 having its leg extending through the cover 4. The base of the handle 12 is provided with a groove 34 mounted over a projection 35 on the closed end of the member 29. A small compression spring 36 is disposed within the handle base and bears against the under side of cover 4 in position to normally maintain the upper side of the base a definite distance from the cover. The ends of the base of the L are provided with smooth curves to facilitate rotation of the push button handle about an axis at right angles to its direction of straight line motion. The leg and the adjacent curved portion of the L-shaped handle are of a size to fit snugly within the opening in the cover 4. The remaining portion of the base as at 37 is enlarged and in the rotated position of the handle forms flanges bearing against the edges of the opening. A colored ring 38 may be placed on the outwardly projecting leg of the handle for a purpose to be hereinafter described.

The operation of this single circuit breaker mechanism will now be described in detail.

The mechanism shown at the bottom of Figure 3 is in the normal closed operating position. In the circuit breaker at the top of Figure 3 the handle 12 has been rotated 90 degrees so that the end of the base of the handle now bears upon the closed end of the member 29 with the enlarged portion 37 forced against the under side of cover 4 by spring 28. This in effect forms a simple toggle and the parts are maintained in this position. As the length of the base of the handle from enlargement of portion 37 to the end is greater than the distance between member 29 and cover 4 in the normal operating position, the member 29 has been moved toward the base moving the contact bar 14 by engagement of the end of slot 31 with notch 32 in the bar. In this movement the bar pivots about its engagement with the bimetallic member 18 and assumes the position shown in the upper circuit breaker in Figure 3 which is the manual "off" position. In again closing the circuit through the breaker it is only necessary to flip the handle back 90° to the position shown in the lower circuit breaker in Figure 3 whereupon the contact bar 14 is moved upwardly to the position therein shown under action of the compression spring 28. When an overload is passed through the circuit breaker it becomes heated and is deflected away from the contact bar 14 thus releasing the end thereof and permitting this end to move away from the main body of the base 3. This movement of the contact bar 14 is caused by the compression spring 28 and the bar 14 moves about the engagement of the notch 32 with the top of the slot 31 into the position shown in Figure 4. The upward movement of the contact bar is restrained only by its engagement

with member 29 which presses against the base of the push button handle 12. As the spring 36 is relatively weak as compared with the spring 28, the base of the handle will be moved against the under side of the cover 4 and the overload tripped condition of the breaker will be indicated by the extended position of the arm of the handle which brings the colored ring 38 into view above the cover. To reset the breaker mechanism it is necessary only to press inwardly upon the push button handle 12. In the extreme inward movement of the handle, the parts assume the reset position shown in Figure 5 with the end of the contact bar again in a position to have its upward movement restrained by the bimetallic member 18 and with the contact tip separated from the stationary contact 16. When the handle is released it will be moved outwardly to the position of the lower breaker in Figure 3 under action of spring 28 and the movable contact 15 will be engaged with the stationary contact. By this method of resetting it is obviously impossible to prevent the automatic tripping of the breaker by holding the operating handle as the contacts are not engaged to close the circuit until the operating handle moves to its normal operating position. If the push button handle is pushed inwardly and held there the contacts simply remain separated as shown in Figure 4. If the operating handle should be held in its non-indicating position as shown in the lower portion of Figure 2 the contacts will separate to the same extent although the now free end of the contact bar will not move to its full upward position until the handle is released. However, the contact carrying end of the bar will still move against the main body of the base and separate the contacts.

The connection of the flexible lead 27 to an intermediate point on the bar 14 serves two functions as it not only lessens the movement of the lead, but also by by-passing a length of the bar places its resistance in the circuit through the latching engagement. This resistance may be increased, as shown, by reducing the cross section of the bar or may be increased in any other manner as by the interposition of insulation or a highly resistant material.

Guides or stops 10 and 20 are provided at the ends of the bar 14. These limit and guide the longitudinal movement of the bar. The limiting stop 10 also provides a positive pivot point for the bar in its movement to reset position. The stop 20 also prevents the bar moving with the bimetal where there is play at the notch 32.

In the multi-circuit form of circuit breaker illustrated, a plurality of circuit breaker mechanisms are mounted upon base 3. In the specific example herein disclosed the base is provided with a generally central dividing wall 39 which divides the mechanism into two duplicate and electrically separate parts each of which may be regarded as a multi-circuit circuit breaker.

Describing now the multi-circuit circuit breaker shown at one side of the dividing wall 39, there is provided a central wall 41 having a cutout portion 42 in which is maintained a stationary contact plate 16. The bolt 17 projects upwardly through the central portion of the wall 41 and rigidly secures the contact plate to the base. The opening through which the bolt 17 projects may then be waxed to provide insulation. Between the contact 16 and the supporting portion of the wall 41 is disposed an insulating strip 43 having cutout portions through which the

movable contacts project to engage the contact 16. The insulating strip 43 projects beyond the contact 16 on both sides of the wall 41 to the member 29 and in combination with the walls of the base forms an arc chamber. This arrangement permits the discharge of gas from the rupturing of a single breaker into the space occupied by the multiple group of breakers thus rendering less necessary any important discharge vent to the outer air. The central wall 41 may be integral with certain of the walls 33 and in this construction the walls 33 may be considered to form projections upon the side walls of the base and the wall 41 rather than as unitary walls slotted to receive the member 14. The ends of the breaker are provided with fibre shields 45 extending between the base 3 and the cover 4 and sealable therewith by rivet 5.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. In an automatic electric circuit breaker, stationary and movable contacts, automatic means for separating said contacts in response to overload, and a manually operable push button for resetting said breaker, said push button rotating about an axis at right angles to its direction of reciprocation to effect manual separation of said contacts.

2. In an automatic electric circuit breaker, relatively movable contacts, automatic means for separating said contacts in response to overload, a manually operable push button handle for said circuit breaker, said handle having a straight line movement to indicate overload trip, a straight line movement to reset the breaker mechanism and a rotary movement about an axis at right angles to its direction of straight line movement to effect manual separation of said contacts.

3. In an automatic electric circuit breaker, stationary and movable contacts, automatic means for separating said contacts in response to overload, a manually operable handle for separating said contacts and for resetting said breaker after an automatic separation, said handle having a transverse rotary camming movement to separate said contacts and a straight line reciprocatory movement to reset said breaker.

4. In an automatic electric circuit breaker, relatively movable contacts, automatic means for separating said contacts in response to overload, and a manually operable L-shaped push button handle for said circuit breaker, an enclosure for said circuit breaker through which said handle

projects, the base of the L within the enclosure being wider than said opening whereby when the handle is rotated 90° about an axis at right angles to its push button movement a stable camming position is attained.

5. In an automatic electric circuit breaker, relatively movable contacts, automatic means for separating said contacts in response to overload, and a manually operable L-shaped push button handle for said circuit breaker, an enclosure for said circuit breaker through which said handle projects, the base of the L within the enclosure being wider than said opening whereby when the handle is rotated 90° about an axis at right angles to its push button movement a stable camming position is attained, and curved surfaces at the end of the base and at the junction of the base and arm of the L to facilitate the rotating movement.

6. In an automatic electric circuit breaker, stationary and movable contacts, automatic means for moving said movable contact to separated position in response to overload, a manually operable L-shaped push button handle, a member intermediate said handle and movable contact, said member having a flat surface engaging the base of said L, a lug on said face, a groove in said base receiving said lug, said lug and groove guiding the rotation of said handle about an axis at right angles to its push button movement.

7. In an automatic electric circuit breaker, relatively movable contacts, automatic means for separating said contacts in response to overload, an operating handle for manually separating said contacts and for resetting said breaker after an automatic separation, an enclosure for said circuit breaker through which said handle projects, said handle having a definite position with relation to the enclosure when the contacts are manually separated, and spring means normally maintaining said handle in a second definite position with relation to the enclosure when said contacts are engaged, said automatic means overcoming the spring means to move the handle to a definite position with relation to the enclosure to indicate the overload tripped position of the breaker.

8. In an automatic electric circuit breaker, a base, relatively movable contacts supported by said base, automatic means for separating said contacts in response to overload supported by said base, a manually operable push button handle for separating said contacts and for resetting said means after an automatic separation, a thin, metallic cover for said breaker having an opening closely receiving a projecting part of the handle, said handle pivoting about an edge of said opening to effect manual separation of said contacts.

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