Jan. 29, 1957 B. E. GETCHELL 2,779,840

ELECTRIC CIRCUIT BREAKERS

Original Filed Aug. 7, 1951 2 Sheets-Sheet 1

Fig. 1.

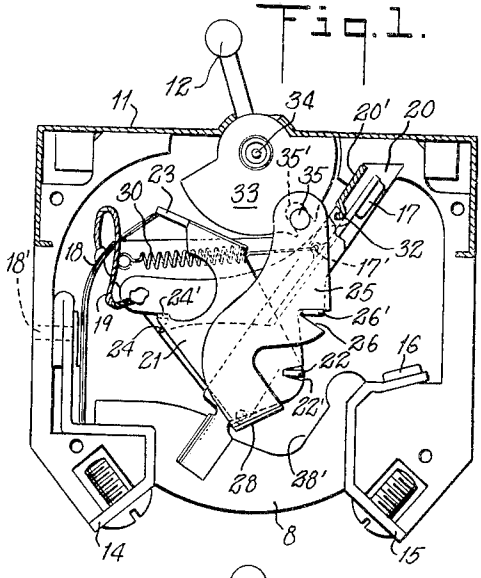


Fig. 2.

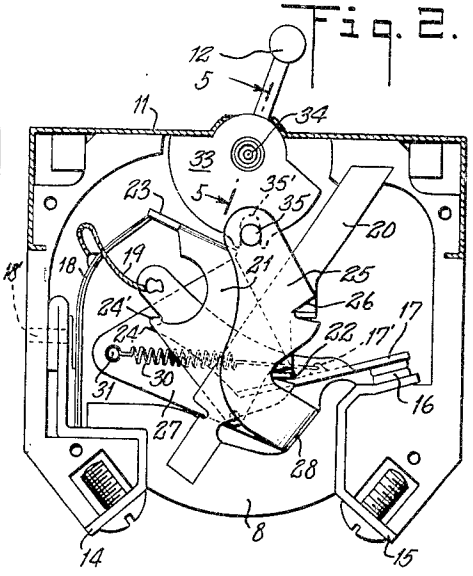


Fig. 3.

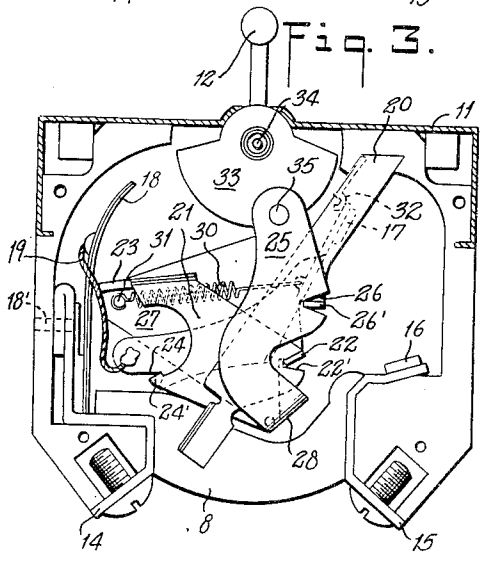
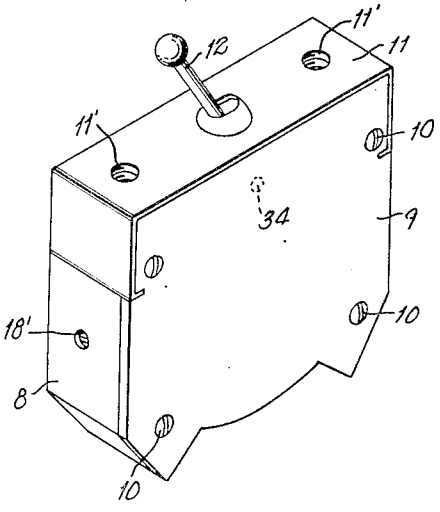


Fig. 4.



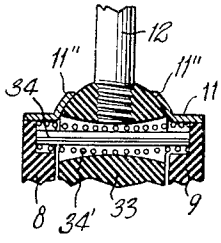


Fig. 5.

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Jan. 29, 1957 B. E. GETCHELL 2,779,840

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Original Filed Aug. 7, 1951 2 Sheets-Sheet 2

Fig. 7.

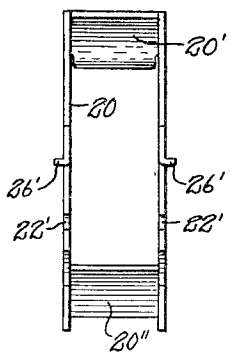


Fig. 6.

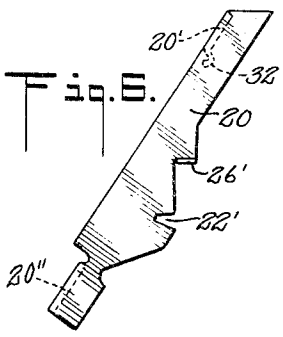


Fig. 8.

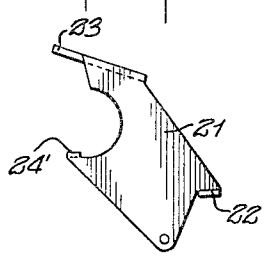


Fig. 12.

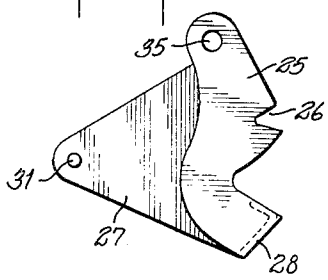


Fig. 13.

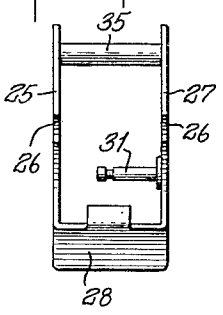


Fig. 9.

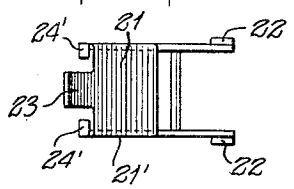


Fig. 10.

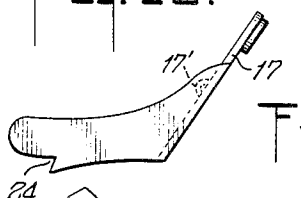


Fig. 11.

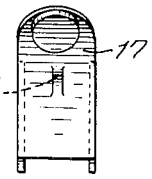


Fig. 14.

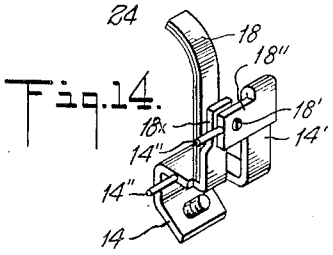
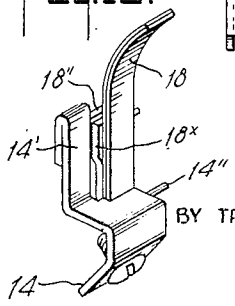


Fig. 15.



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2,779,840

ELECTRIC CIRCUIT BREAKERS

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Original application August 7, 1951, Serial No. 240,688, now Patent No. 2,692,931, dated October 26, 1954. Divided and this application April 26, 1954, Serial No. 425,449

11 Claims. (Cl. 200—116)

The present invention relates to an improved and simplified electric circuit breaker and this application is a division of application Serial Number 240,688, filed August 7, 1951, now Patent Number 2,692,931, issued October 26, 1954, and assigned to the same assignee as the present invention.

It is an important object to provide a circuit breaker in which the moving parts pivot on a metal frame member without the use of separate pivot pins.

It is another object of this invention to provide a circuit breaker of compact but effective construction in which the mechanism is manually operable to open and close a circuit and which automatically opens the circuit upon an overload in the circuit.

Another object is to provide a circuit breaker of the snap-acting type which is small and compact, but in which a comparatively great separation of contacts is possible.

Another object is to provide a circuit breaker which can successfully interrupt relatively large electric currents and especially direct currents.

Figure 1 is a side view and partial section of the circuit breaker showing the parts in the normal open circuit position.

Figure 2 is a similar view but showing the parts in the closed position.

Figure 3 is a similar view showing the parts in the automatically tripped position.

Figure 4 is a perspective view of the circuit breaker.

Figure 5 is a fragmentary detail view showing the support for the finger lever.

Figure 6 is a side view of the bridge or supporting member.

Figure 7 is an edge view of the same.

Figure 8 is a side view of the tripping element.

Figure 9 is an edge view of the same.

Figure 10 is a side view of the movable switch contact member.

Figure 11 is an edge view of the same.

Figure 12 is a side view of the rocker member.

Figure 13 is an edge view of the same.

Figure 14 is a perspective view of the terminal and bimetal unit viewed from the outer edge.

Figure 15 is a similar view of the unit seen from the inner face.

The mechanism is enclosed in an insulating housing consisting of a body part 8 which supports the mechanism and a removable part 9 which serves as a cover plate. The parts are held together by suitable fastening members such as screws or rivets 10, 10. A face plate 11 extends across the outer edge or end of the housing and provides screw seats 11'. A movable finger piece or actuating lever 12 extends outwardly from the face plate for manual operation of the circuit breaker.

Circuit terminals 14 and 15 are set into opposite ends of the body part of the housing. A stationary contact 16 is connected to the terminal 15 and a movable switch or

contact member 17 is connected to the thermally responsive, current responsive, or bimetal strip 18 by a flexible conductor 19, and the strip is connected to the terminal 14. The bimetal strip is carried by the arm 18x and may be adjusted by a screw 18' which is adjustable in arm 18''. The part 18'' extends laterally from the upper end of arm 14' which is formed integrally with the terminal 14. This unit is mounted in a recess in the housing and may have projecting pins 14'', 14'' located in recesses in the body to assist in holding the unit in place.

A main supporting or bridge member 20 is supported at its opposite ends in recesses in the body of the housing. This member has two sides connected by cross walls 20', 20''.

The tripping member 21 also has two sides, each of which is provided with a lug 22 at one end which projects outwardly into a bearing notch 22' in the bridge member 20 and has a cross wall 21'. The nose 23 carried by the cross wall 21' normally rests upon the tip of the bimetal strip 18. The switch member 17 is hinged to the trip member 21 and for that purpose has a notch or bearing 24 at each side receiving the lug 24' which extends inwardly from the opposite end of the adjacent side wall of the trip member 21.

The rocker or operating member 25 has opposed notches 26, 26 which provide bearings for the opposed lugs 26', 26' which project outwardly from the sides of the bridge 20. This rocker has an integral arm 27 connected to it by a cross wall 28 to form a generally U-shaped structure embracing the supporting or bridge member 20. A spring 30 is anchored at one end to the pin 31 on the arm 27 and is connected at 17' at its other end to the movable switch member 17. This spring biases the switch member 17 against the stop 32 on the wall 20' of the bridge 20.

From the above it is seen that the operating spring 30, connected as it is to contact member 17 and operating member 25, biases switch member 17 into pivotal engagement with the lugs 24' of the trip member 21 and the lugs 22 of the trip member 21 into the notches 22' on the bridge or frame 20 as well as the notches 26 of the operating member into engagement with the lugs 26' on the frame. Thus the trip member 21 and operating member 25 are held in pivotal engagement and assembled relation with respect to the side edges of the frame 20 and contact arm 17 held assembled on the lugs 24' of the trip member 21 by means of the operating spring 30.

The operating finger piece 12 is connected to its insulating hub 33 on the rock shaft 34 supported between body 8 and cover 9. A helical spring 34' surrounds the shaft 34 and serves to bias the hub 33 upwardly into engagement with flange or socket 11'' on the face plate 11. See Figure 5.

A bearing pin 35 which connects the two sides of the rocker or operating member 25 extends into a slot 35' in the hub 33 for moving the rocker.

The spring 30 when the arm 27 is in lower position pulls the movable switch member 17 into closed circuit position as shown in Figure 2, and when the arm 27 is in upper position the spring pulls the switch member to the open circuit position as shown in Figure 1.

When in closed circuit position, the part 28 of the rocker 25 abuts against the body of the housing at 28'.

To manually open the circuit, the lever 12 is moved to the left from the position of Figure 2 to the position of Figure 1. This turns the rocker 25 about pivots 26' in a clockwise direction and carries the anchor end of the spring 30 above the pivot lugs 24' and throws the switch member 17 to the "off" or open circuit position. In this position, the wall 28 abuts against the bridge member 20.

To close the circuit after manual opening, the lever 12 is manually moved to the right from the position of

Figure 1 to the position of Figure 2 thereby turning the rocker 25 anticlockwise about its pivots 26'. This moves the arm 27 downwardly carrying the anchored end of the spring 30 below the bearings 24' so that the spring turns the movable switch contact 17 around said bearings 24' and snaps it into closed position against the stationary contact 16.

When the circuit is closed and an overload in the circuit warps the bimetal strip 18, the nose 23 of the tripping member 21 is released and the spring 30, acting through the switch member 17, applies pressure against the pivot bearings 24' of the tripping member 21, turns the tripping member about the bearings 22, and throws the trip member into the position of Figure 3 thereby carrying the switch member 17 to "off" position.

To reset the switch mechanism, after being tripped to the open position of Figure 3, the lever 12 is manually moved to the left thereby turning rocker 25 clockwise on pivots 26'. The wall 28 then engages the lower edge of the trip member 21 and turns it clockwise about the pivots 22. This forces the nose 23 to travel up the bimetal strip 18 until it latches on to the tip of the bimetal as shown in Figure 1.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A circuit breaker comprising a housing having recesses therein, a supporting bridge member having its ends mounted in the recesses of the housing, a bimetal strip member anchored at one end in the housing and adapted to bend when heated, a trip member hinged to said bridge member and normally latched to said bimetal strip member, a switch member hinged to said trip member, a rocker member hinged to said bridge member, means for tilting the rocker member, and a spring connecting said rocker member and said switch member and applying torque to said trip member to turn the trip member on said bridge member when said bimetal member releases said trip member upon an overload in the circuit of said switch member.

2. A circuit breaker comprising a housing, a supporting bridge member mounted in the housing, a bimetal strip member anchored at one end in the housing and adapted to bend when heated, a trip member hinged to one edge of said bridge member and normally latched to said bimetal strip member, a switch member hinged to said trip member, a rocker member hinged to said bridge member, a lever having a hub for tilting the rocker member, and a spring connecting said rocker member and said switch member and applying torque to said trip member to turn the trip member on said bridge member when said bimetal strip member releases said trip member upon an overload in the circuit of said switch member, said rocker member and said trip member having interconnecting parts whereby the trip member may be reset by coaction of the parts.

3. A circuit breaker comprising a housing, a supporting bridge member having its ends fixed in the housing, a bimetal strip member anchored at one end in the housing and adapted to bend when heated by an overload in the circuit, a trip member hinged to one edge of said bridge member and normally latched at one end to said bimetal strip member, a switch member hinged to said trip member, a rocker member hinged to said bridge member, means connecting said rocker member and said switch member and applying pressure to said trip member to turn the trip member on said bridge member when said bimetal member releases said trip member upon an overload in the circuit of said switch member, and manually operable means for resetting said trip member.

4. A circuit breaker comprising a housing, a supporting bridge member having its ends fixed in the housing, a bimetal strip member anchored at one end in the housing and adapted to bend when heated by an overload in the circuit, a trip member hinged to said bridge member and normally latched at one end to said bimetal strip member, a switch contact member hinged to said trip member, a rocker member hinged to said bridge member, means connecting said rocker member and said switch contact member and applying pressure to said trip member to turn the trip member on said bridge member when said bimetal member releases said trip member upon an overload in the circuit of said switch contact member, and manually operable means for resetting said trip member.

5. A circuit breaker comprising a housing, a supporting bridge member fixed in the housing, a bimetal strip member anchored at one end in the housing and adapted to bend when heated, a trip member hinged to said bridge member and normally latched to said strip member, a switch contact member hinged to said trip member, a rocker member hinged to said bridge member and means for moving said trip member when released by said bimetal strip member including a spring connecting said rocker member and said switch contact member and applying pressure to said trip member to turn the trip member on said bridge member when said bimetal member releases said trip member upon an overload in the circuit of said switch contact member.

6. In a circuit breaker, an insulating body, a face plate therefor, a bridge having two parallel members supported in the body, an actuating lever having a hub hinged to turn between said face plate and said body, a rocker member connected to said hub and having two arms hinged to edges of the respective parallel members of said bridge, a current-responsive member, a tripping member hinged to said edges of said bridge member and normally restrained by said current-responsive member, and a switch member hinged to said tripping member.

7. In a circuit breaker, an insulating body, a face plate having a recess, a bridge member supported in the body, an actuating lever having a hub hinged to turn in said recess between said face plate and said body, a rocker member connected to said hub and having two arms hinged to edges of the respective bridge members, a current-responsive member supported in said body, a tripping member hinged to said edges of said bridge members and normally restrained by said current-responsive member, a switch member hinged to said tripping member, and a spring connecting said rocker member and said switch member.

8. In a circuit breaker, a housing of insulation material, a fixed contact, a metallic frame member supported in said housing and including two spaced parallel side portions, a trip member having a pivotal support on said frame member, a movable switch member having a pivotal support on said trip member and carrying a movable contact for cooperating with said stationary contact, an operating member having a pivotal support on said frame member, spring means connecting said operating member and said movable switch member, and electro-responsive means operatively engaging said trip member, all of said pivotal supports being formed by an edge-to-edge engagement of the parts.

9. In a circuit breaker, a housing of insulation material, a fixed contact, a metallic frame member supported in said housing and including two spaced parallel side portions, a trip member having a pivotal support on said frame member, a movable switch member having a pivotal support on said trip member and carrying a movable contact for cooperating with said stationary contact, an operating member having a pivotal support on said frame member, spring means connecting said operating member and said movable switch member, and electro-responsive means operatively engaging said trip member, each of said pivotal supports being formed by a lug bent out from one piece and adapted to bear edgewise in an open notch in the cooperating piece.

10. In a circuit breaker, a housing of insulation material, a fixed contact, a metallic frame member supported in said housing and including two spaced parallel

side portions, a trip member having a pivotal support on said frame member, a movable switch member having a pivotal support on said trip member and carrying a movable contact for cooperating with said stationary contact, an operating member having a pivotal support on said frame member, spring means connecting said operating member and said movable switch member, and electro-responsive means operatively engaging said trip member, each of said pivotal supports being formed by a lug bent out from one piece and adapted to bear edgewise in an open V-shaped notch in the cooperating piece, the bias of said spring means being such as to urge each of the said pivotally supported parts into pivotal engagement with the respective cooperating parts.

11. A circuit breaker mechanism including a frame member having parallel side walls, an operating member, a trip member, a movable contact member, cooperating lugs and open sided notches formed on said side walls said operating member and said trip member to pivotally

mount said last two mentioned members on said frame, cooperating lugs and open sided notches on said trip member and said movable contact and pivotally mounting said movable contact on said trip member and operating spring means connecting said operating member and said contact member and urging said lugs into said notches to hold said operating and trip members assembled on said frame and said contact member assembled on said trip member.

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