March 24, 1959 J. C. HOLMES 2,879,356

ELECTRIC CIRCUIT BREAKERS

Filed Nov. 22, 1957

Fig. 1

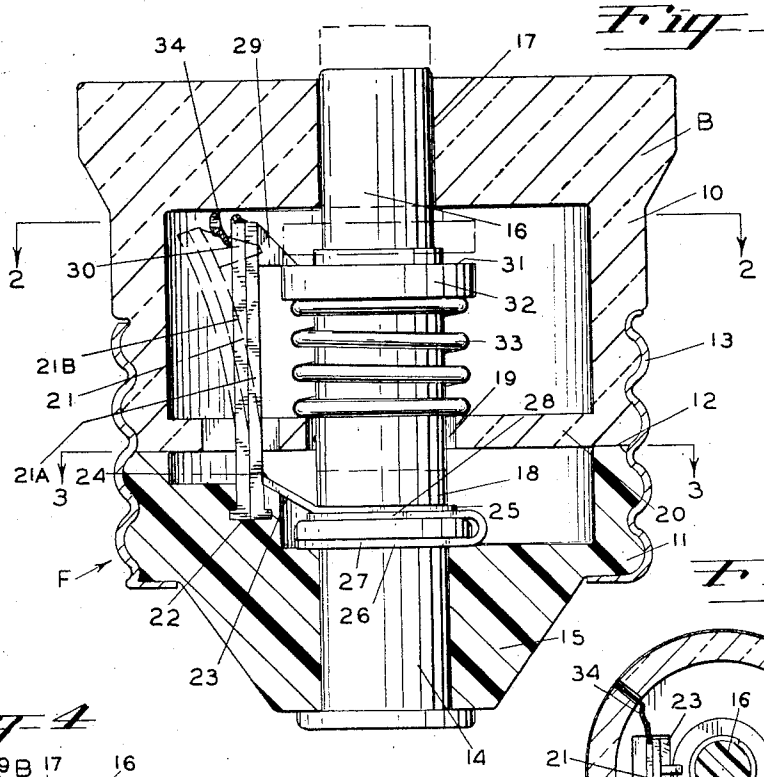


Fig. 2

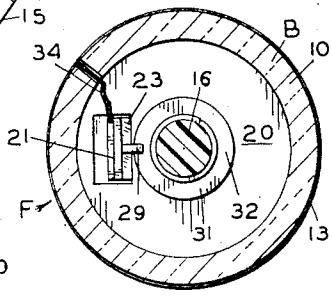


Fig. 4

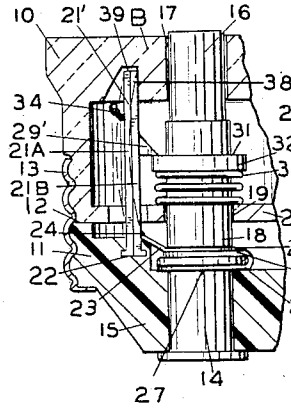


Fig. 6

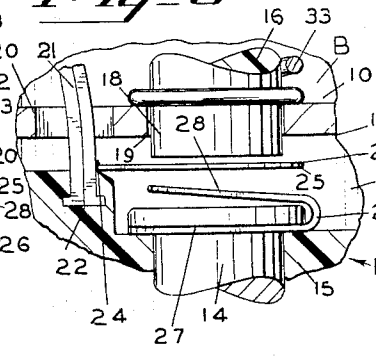


Fig. 3

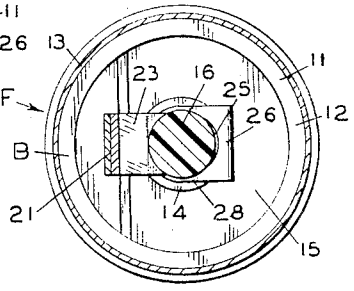
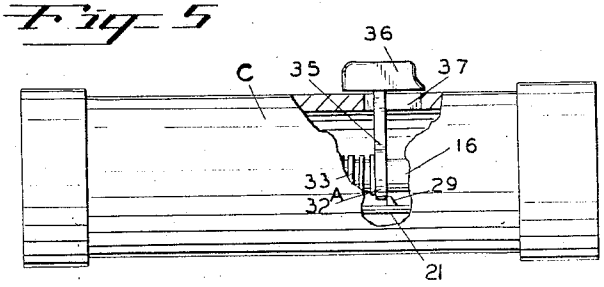


Fig. 5



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ELECTRIC CIRCUIT BREAKERS

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5 Claims. (Cl. 200—116)

The present invention relates to automatic electric circuit breakers and particularly to such devices for replacing standard screw-in fuse or cartridge plugs.

The primary object of this invention is to provide a circuit breaker capable of being re-set after an overload has taken place causing the circuit breaker to open.

A further object of this invention is to provide a circuit breaker constructed so as to conveniently replace screw-in, cartridge fuses, and other standard fuse plugs.

Another object of this invention is to provide a circuit breaker designed to eliminate the forming of electric arcs on the breaking of the circuit.

A still further object of this invention is to provide a circuit breaker that maintains a firm solid contact between the contact elements of the breaker until the overload takes place, when a complete separation therebetween will occur instantly.

Other objects and advantages will become apparent in the following specification when considered in the light of the attached drawings, in which:

Figure 1 is a vertical sectional view of the invention.

Figure 2 is a transverse sectional view, taken on the line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is a transverse sectional view, taken on the line 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is a view similar to Figure 1 of a modified form of the invention shown partially broken away for convenience of illustration.

Figure 5 is a side elevation of another modified form of the invention shown partially broken away and in section.

Figure 6 is a fragmentary view similar to Figure 1 showing the contact mechanism thereof in open position.

Referring now to the drawings in detail wherein like reference numerals indicate like parts throughout the several figures, the reference character F indicates generally a circuit breaker constructed in accordance with the invention.

The circuit breaker F includes an insulated body B having an upper section **10** and a lower section **11** engaging at **12** and secured together by a metallic sleeve **13**. A contact terminal **14** is located within lower tip **15** of the lower section **11**.

A plunger **16** formed of insulation material extends through an opening **17** on the end of the section **10** opposite the section **11**. The plunger **16** has its inner end **18** passing through an opening **19** in a partition **20** integrally formed in the section **10**.

Fixedly mounted within the insulated body B is a bi-metal strip **21**. The strip **21** is fixedly secured within a socket **22** in the lower section **11** by means of being embedded within insulation. The lower end of the bi-metal strip **21** is connected to the terminal **14** by a spring bar **23** fixedly mounted thereto at **24**. The opposite end **25** of the bar **23** contacting the U-shaped resilient metallic member **26**. Lower leg **27** of member **26** is fixedly secured to the upper end of the terminal **14** by soldering or riveting. An upper leg **28** of the member **26** is engaged by the lower side of the end **25** of the contact bar **23** under a spring tension existing between the contact bar **23** and the U-shaped member **26**, which will be more fully described later.

A latch **29** is formed as part of upper end **30** of the bi-metal strip **21**. The latch **29** normally engages upper surface **31** of a shoulder **32** which forms part of the plunger **16**. The shoulder **32** is made of a metallic material to resist wear.

A spring **33** encompasses the plunger **16** and has its upper end engaging the lower side of the shoulder **32** and its lower end engaging the upper surface of the partition **20** thus placing an upward tension on the plunger **16** to lift the same when the latch **29** is released in the following manner.

The metallic sleeve **13** is connected to the upper end **30** of the bi-metal strip **21** by means of flexible connector **34**. When electric current passes between the sleeve **13** and the terminal **14**, it will pass through the bi-metal strip **21** from the sleeve **13** through the connector wire **34**, down through the strip **21** across the metallic bar **23**, into the resilient U-shaped member **26**, into the contact **14**, completing an electric circuit through the fuse socket within the fuse box.

When an overload takes place, the bi-metal strip **21** takes the position shown by the broken lines, Figure 1, releasing the latch **29** from the upper surface **31** of the shoulder **32** so that the spring **33** can raise the plunger **16** and allow the end **25** of the metal bar **23** to disengage itself from the upper leg **28** of the element **26**, breaking the electric circuit extremely quickly without causing an arc to form.

The bi-metal strip **21** consists of two separate kinds of material **21A** and **21B**. When the strip **21** is heated, the material **21A** expands faster than the strip **21B**. This causes the strip **21** to move to the broken line position in Figure 1, releasing the latch **29**. When the latch is released, the plunger **16** raises disengaging the bar **23** from the upper leg **28** of the U-shaped member **26** breaking the electric circuit through the circuit breaker F.

Referring to Figure 4, a modified form of embodiment is illustrated wherein the upper end **38** of the bi-metal strip **21'** is longer and is anchored within a socket **39**. The strip **21'** operates slightly different than that shown in Figure 1, in that the metal **21A** is on the opposite side of the strip **21'** to that shown in Figure 1, due to the fact that the upper end of the strip **21'** is anchored in the socket **39**, the strip **21'** will take the broken line position pulling the latch **29'** away from the shoulder **32** of the plunger **16**.

Referring to Figure 5, cartridge fuse C incorporates the invention in modified form. A lever **35** extends at right angles to the fuse C and forms part of a shoulder **32a**. The lever **35** passes through a slot **37** on the side of the cartridge C terminating in a thumb button **36** used to reset the circuit breaker F.

The mode of operation of the circuit breaker F will now be described. Figure 1 illustrates the plunger **16** in lowered position with the end **25** of the contact bar **23** in contact with the leg **28** of the U-shaped terminal **26**, making an electric connection between the threaded metallic sleeve **13**, the connector **34** of the bi-metal strip **21**, and out the terminal **14**, completing an electric circuit through the fuse socket, not here shown.

When an overload takes place, the bi-metal strip **21** is brought into the broken line position by the difference of expansion between the materials **21A** and the material **21B** to cause the latch **29** to release itself from the shoulder **32**, allowing the spring **33** to raise the plunger **16** and break the contact between the bar **23** and the U-shaped

member 26 and the terminal 14. When the bi-metal strip 21 cools off, the operator can push down on the plunger 16, again latching the shoulder 32 under the latch 29.

Having thus described the preferred embodiments of the invention, it should be understood that numerous structural modifications and adaptations may be resorted to without departing from the scope of the appended claims.

What is claimed is:

1. An electric circuit breaker comprising a body, a contact element fixedly secured axially of said body at one end thereof, a plunger arranged in axial alignment with said contact element and supported in said body for axial reciprocation therein, said plunger having a handle forming portion thereof arranged to project from said body, a spring in said body engaging and normally biasing said plunger away from said contact, a firmly responsive bimetallic latch mounted in said body generally parallel to said plunger for releasably securing said plunger against movement away from said contact, a spring contact bar secured to said latch at one end thereof and extending between said plunger and said contact element in spaced relation with respect to said contact element with said plunger in released position, said spring contact bar and said contact member being held in engagement by pressure from said plunger with said plunger secured by said latch, and means connecting the opposite end of said bimetallic latch in the circuit to be broken whereby the total electric current of the circuit passes through said bimetallic latch heating said latch when overloaded to move said latch releasing said plunger, permitting disengagement of said spring contact bar from said contact element.

2. A device as claimed in claim 1 wherein means are provided on said body for threaded engagement of said body in an electric socket.

3. A device as claimed in claim 1 wherein said body comprises a hollow cartridge having external contact portions on opposite ends thereof.

4. A device as claimed in claim 1 wherein said contact element is provided with a resilient portion biased in a direction forward said spring contact bar.

5. A device as claimed in claim 1 wherein a contact terminal is rigidly mounted in one end of said body and said contact member is mechanically and electrically connected thereto.

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