Sept. 23, 1958 W. W. OLIVE, JR 2,853,581

ELECTRICAL CUTOUTS

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FIG. 1

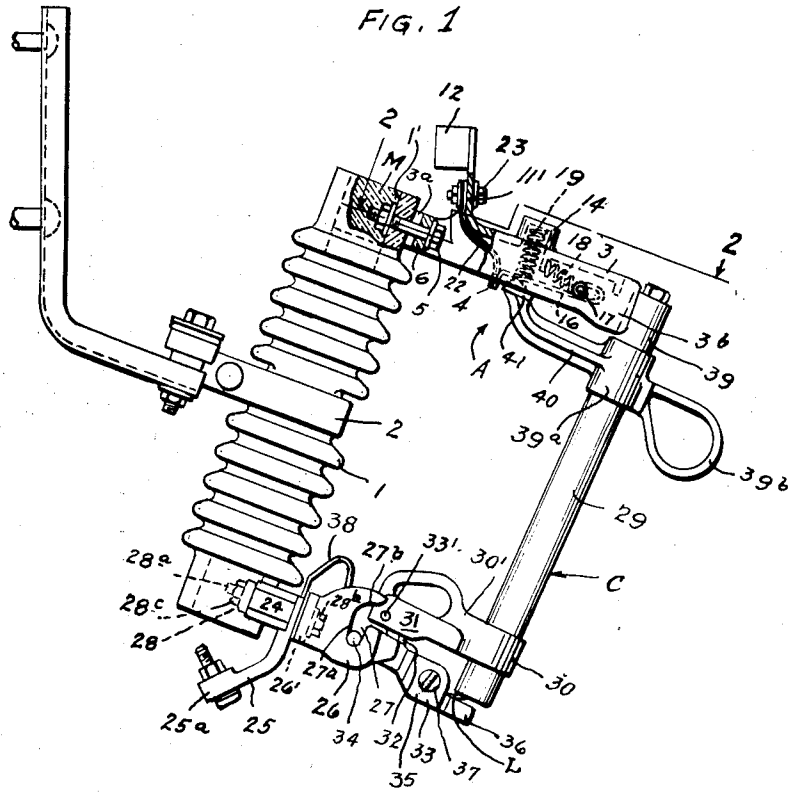
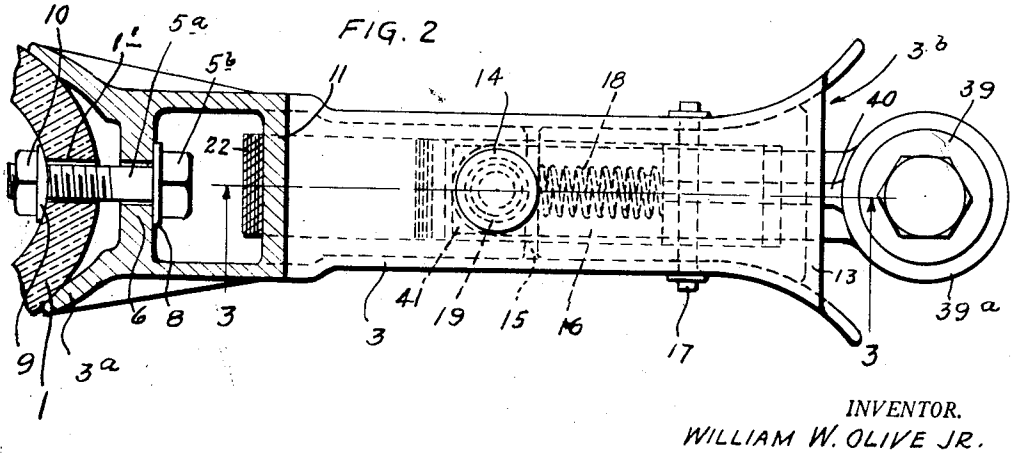


FIG. 2



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FIG. 3

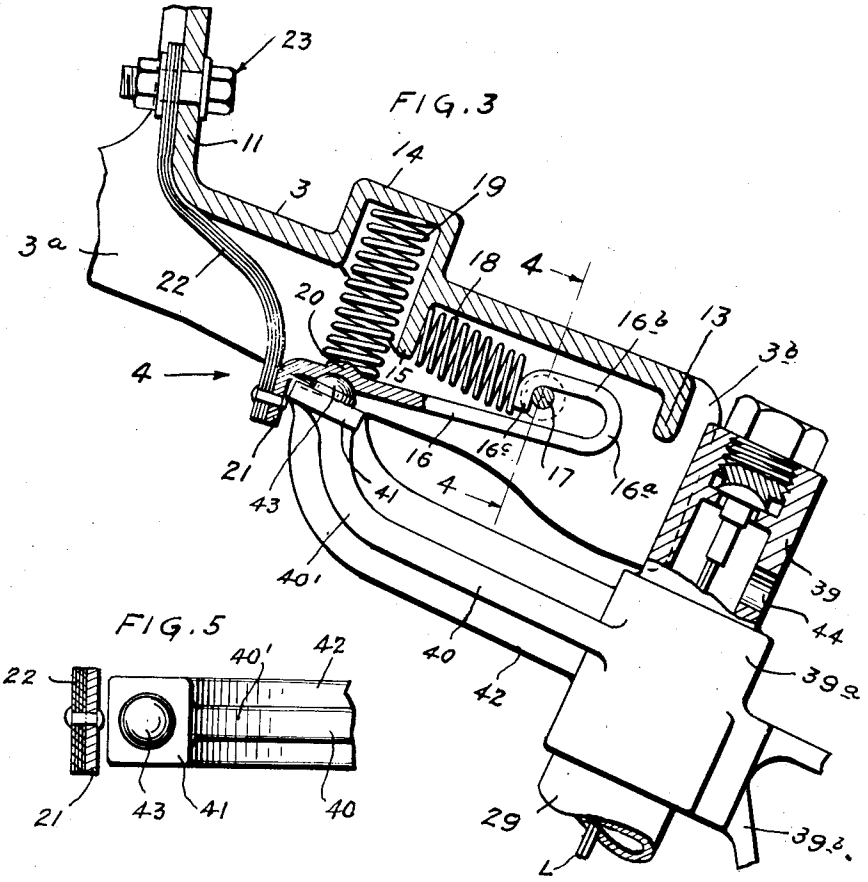


FIG. 5

FIG. 4

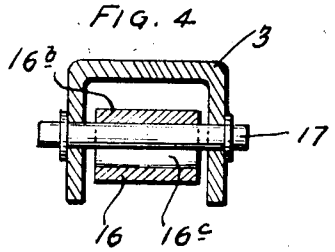
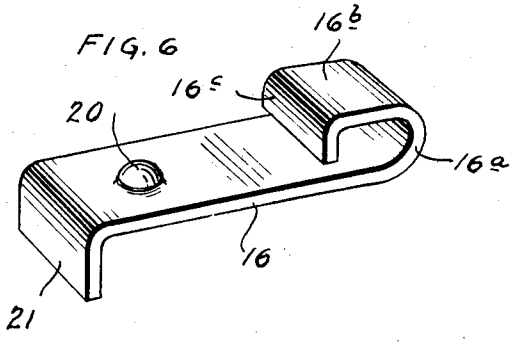


FIG. 6



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United States Patent Office 2,853,581 Patented Sept. 23, 1958

2,853,581

ELECTRICAL CUTOUTS

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Application October 5, 1955, Serial No. 538,589

11 Claims. (Cl. 200—116)

This invention relates generally to fuse cutouts, and particularly to electrical cutouts of the general type disclosed by United States Patent No. 2,179,749, granted on November 14, 1939, in the names of Francis J. McCluskey and Charles Adin Fox, and assigned to James R. Kearney, Corporation of St. Louis, Missouri, which embodies a pivotally mounted fuse cartridge of the expulsion type for completing a circuit through the cutout, which cartridge swings automatically to open position responsive to fuse rupture, the invention relating more specifically, though not exclusively, to a particular type of contact structure for latching the fuse cartridge of the cutout in the closed, effective cutout position.

Fig. 1 is a side elevation of the improved electrical cutout of this invention with a part thereof shown in section.

Fig. 2 is a section taken on the staggered line 2—2 of Fig. 1.

Fig. 3 is a fragmentary section of a portion of the cutout shown in Fig. 1 taken on line 3—3 of Fig. 2.

Fig. 4 is a cross-section taken on line 4—4 of Fig. 3.

Fig. 5 is a fragmentary view partly in elevation and partly in section showing parts of the cutout structure.

Fig. 6 is a perspective view of the upper contact of the improved cutout of this invention.

In the drawings, wherein is shown for purposes of illustration, merely, one embodiment of the invention, A designates a cutout generally. The cutout A comprises an insulator 1, preferably, though not of necessity, of the petticoat type, said insulator being supported from a crossarm, or other support, by a suitable hanger structure that includes a band 2 that embraces said insulator. Attached to the upper portion of the insulator 1 is a supporting member 3 for the upper contact structure 4, said supporting member having a bifurcated rear end portion 3^a that straddles an upper portion of the insulator 1 and having a forward portion which comprises outwardly and forwardly flared portions 3^b. The supporting member 3 is secured to the insulator 1 by means of a bolt and nut assembly 5. The insulator 1 has an opening 1′ formed in its upper end portion, the shank portion of the bolt 5^a of the bolt and nut assembly being extended through an opening formed through a wall 6 of the supporting member 3, and through an opening 1^a formed through the wall of the insulator, a washer 8 being interposed between said wall 6 of the supporting member and the head portion 5^b of the bolt, and a washer 9 being interposed between a nut 10 screwed on the screw-threaded shank of the bolt 5^a. After the supporting member has been fastened to the insulator through the instrumentality of the bolt and nut assembly the opening 1′ at the top of the insulator is filled with cement or other suitable hardening material M. This filling M closes the opening 1′ and prevents the accumulation therein of water which, in cold weather, may freeze and cause trouble.

The supporting member 3 includes an extension 11 which provides a terminal whose upper end 11′ is shaped to provide a socket portion of a clamp, there being a

clamp head 12 which is operable to clamp an incoming conductor between portions of the socket portion and the head so as to make good electrical connection between the incoming conductor and the supporting member 3. The supporting member 3 is provided with a downturned wall 13 adjacent to its forward end, and said supporting member is provided also with an upstanding portion 14 which provides a spring seat that serves a function to be hereinafter set forth. Additionally, the supporting member 3 is provided with a downturned wall 15 which serves a purpose to be hereinafter referred to.

Supported by the supporting member 3 is an upper contact 16 which is disposed between the opposed side walls of the supporting member 3 and beneath the top wall thereof. The forward portion of the contact 16 is shaped as is shown to good advantage in Figs. 1 and 3; that is to say, said forward portion of said contact comprises an elongated loop made up of an upwardly and rearwardly curved portion 16^a, a substantially straight portion 16^b which is spaced upwardly from the main body of the contact 16, and a downwardly curved portion 16^c at the rear end of said contact portion 16^b. The contact 16 is anchored in place by a pin 17 which is supported at its opposite ends in openings formed in the opposed side walls of the supporting member 3, the pin 17 extending transversely of the space between the opposed side walls of said supporting member, the inner face of the curved portion 16^c of the contact 16 contacting with a portion of the pin 17, a coil spring 18 contacting at one of its ends with the outer face of the curved portion 16^c of the contact 16 and contacting at its opposite end with the wall 15, and the coil spring 18 tending to force the inner face of the curved contact portion 16^c against the pin 17. Also, a coil spring 19 is seated at one of its ends in the upstanding portion 14 of the supporting member 3 with its opposite end contacting with a rear portion of the contact 16. At the location of the coil spring 19 the contact is provided with a seat 20 which serves a purpose to be hereinafter referred to, and said contact has a downturned portion 21 at its rear end. Secured to the downturned portion 21 of the contact 16 is an end portion of a shunt 22, the opposite end of said shunt being secured by a bolt and nut assembly 23 to the extension 11 of the supporting member 3.

Secured to the lower portion of the insulator 1 is a saddle 24 with which is associated a lower terminal 25, the upper portion of the lower terminal 25 being interposed between the outer face of said saddle 24 and the rear face of the rear wall 26′ of a U-shaped hinge member 26. The opposed side walls of the hinge member 26 are provided with alined slots 27 which are shaped as is shown in Fig. 1; that is to say, said slots have substantially straight portions 27^a from which upwardly and forwardly portions 27^b extend, the upwardly and forwardly curved upper portions 27^b of the slots 27 being open at the forward portions of the hinge member 26. The structure which comprises the saddle 24, the terminal 25 and the hinge member 26 is secured to the insulator by a bolt and nut assembly 28, the shank of the bolt being extended through an opening formed through the rear wall 26′ of the hinge member 26, through an aligned opening formed through the upper portion of the terminal 25, through an opening formed through the saddle 24 and through an opening formed through the wall of the lower portion of the insulator. The bolt 28^a of the bolt and nut assembly 28 is provided at one end with a head 28^b and receives on its screwthreaded opposite end a nut 28^c, and the terminal 25 is provided with a clamping portion 25^a with which is associated a clamping bolt that serves to clamp an outgoing conductor to said terminal 25.

The cartridge C of the cutout A comprises a tubular structure 29 which has fixedly secured to its lower por-

tion a bracket **30**, said bracket having an extension **30'** which projects rearwardly from the tubular structure of the cartridge C. The extension **30'** of the bracket **30** has a recess **31** formed therein into which a projected portion **32** of a lever **33** extends, said projected portion **32** of the lever **33** being pivotally secured to said bracket through the instrumentality of a pivot pin **33'** that extends transversely of the recess **31** of the bracket **30**. The lever **33** is provided with trunnions **34** at the opposite sides thereof that extend in opposite directions from said lever and these trunnions are disposed in the slots **27** of the hinge member **26**, the bottoms of said slots serving as bearings for said trunnions. The lever is provided with an enlarged portion **35** from which is extended forwardly a bifurcated extension **36**, and said enlarged portion is provided with a screwthreaded opening that receives a wing bolt **37** by means of which an end portion of a fuse link L is fastened to said lever **33**. The fuse link extends downwardly through the tubular structure **29** of the cartridge C and the lower end portion of said fuse link is turned about one of the legs of the forward, bifurcated extension **36** of the lever **33**, said end portion of the fuse link then extending up to the wing bolt by which it is clamped to the lever **33**. The cutout structure A includes a combined shunt and spring **38**, one end of which is secured in place by being clamped by the bolt and nut assembly **28** between the saddle **24** and the terminal **25**, and the other end of which bears against a rear end portion of the lever **33**.

Secured to the upper portion of the tubular structure of the cartridge C is a member **39** which is provided with a cylindrical portion **39a** that embraces the tubular structure of the cartridge and is pinned, or otherwise secured thereto, and extended forwardly from said cylindrical portion is an eye portion **39b**. Extending rearwardly from the cylindrical portion **39a** of the member **39** is an arm **40**, said arm being turned upwardly at its rear end, as shown at **40'** in the drawings. The upturned end portion **40'** of the arm **40** is provided with a flange **41** at its top and said arm is provided with suitable ribbing **42** to impart the required strength thereto, and projected upwardly from the flange **41** at the end of the upturned portion of the arm **40** is a contact **43** having a curved top face which enters the seat **20** of the contact **16** when the cartridge C is in the closed position, as best shown in Fig. 3.

In the operation of the cutout of this invention, the cartridge C is in the position shown in Fig. 1 when the cartridge is fused and ready for use, the lower end portion of fuse link L being fastened to the lever **33** through the instrumentality of the wing bolt **37**, and the contact **43** of the arm **40** is seated in the seat **20** of the contact **16**. When the cartridge is disposed in the closed-switch position the fuse link is held under constant tension, this by reason of the tendency of the lever **33** to turn about the axes of the trunnions **34** as a result of force imparted to said lever by the combined shunt and spring **38**. In the use of the cutout, when the fuse link becomes ruptured, as a result of passage of abnormal current therethrough, the lever **33**, freed at its outer or link-engaging end, and acting under the forces imparted thereto, turns rapidly about the two axes defined by the trunnions **34** and pivot pin **33'**. Movement of the lever **33** about the trunnions **34** is accompanied by an endwise lowering of the tubular structure of the cartridge C, which, when clear of the contact **16**, swings under gravity action to full open position. It will be noted that the lever **33** has a high velocity ratio and that its outer end to which the fuse link is attached moves very rapidly. Accordingly the ruptured ends of the fuse link become quickly separated, resulting in practically instantaneous extinguishment of the arc created therebetween.

The upper contact structure **4** functions in the use of the cutout of this invention to cushion the shock caused by the formation of gases within the cartridge tube when the fuse link blows. These gases are exhausted through an opening **44** adjacent to the upper end of the tubular structure of the cartridge C, and because the contact **16** is floating and is forced forwardly by the coil spring **18**, the entire contact **16** may be moved rearwardly by the upper portion of the curved portion **40'** of the arm **40** of the cartridge C contacting with the downturned portion **21** of said contact **16**. As a result the downturned portion **21** of the contact **16** is not bent by rearward movement of the upper portion of the cartridge C, because the shock which causes such rearward movement of the upper portion of the cartridge C is absorbed by the coil spring **18**. Also, the coil spring **19** forces the rear portion of the contact **16** into proper position for the reception in the seat **20** of the contact **43** of the cartridge C, said contact **43** riding under the inclined portion of the contact **16** and raising it slightly against the force of the coil spring **19**, to find its way into the contact seat **20** of said contact **16** when the cartridge is being moved into the closed-switch position.

It is to be noted that the cartridge C of the cutout of this invention is doubly vented, the gases being vented at the open bottom of the tubular structure of the cartridge, and said gases also being vented through the opening **44** which is located adjacent to the upper end of the tubular structure of the cartridge, the discharged gases being directed therethrough forwardly away from adjacent live equipment.

I claim:

1. A contact structure for an electrical cutout of the type having an expulsion cartridge which is adapted to swing automatically to the open position on rupture of a fuse link related to said cartridge and having an insulator for supporting parts of said cutout, said contact structure comprising a supporting member supported by said insulator for supporting said contact structure, a contact element having a loop at one end thereof, means for attaching said contact element to said supporting member for floating movement, a spring so connected to said loop as to bias said contact element in the direction of its length, a second spring so connected to said contact element as to bias a portion of said contact element for movement in a direction transversely of the length of said contact element, and a member mounted on a portion of said cartridge which is engaged by a portion of said contact element for securing said cartridge in the closed position thereof.

2. A contact structure for an electrical cutout of the type having an expulsion cartridge which is adapted to swing automatically to the open position on rupture of a fuse link related to said cartridge and having an insulator for supporting parts of said cutout, said contact structure comprising a supporting member supported by said insulator for supporting said contact structure, a contact element having a loop at one end thereof, means comprising a pin extended through said loop for attaching said contact element to said supporting member for floating movement, a spring so applied to said contact element as to bias it for movement in the direction of its length, a second spring so applied to said contact element as to bias a portion thereof for movement in a direction transversely of the length of said contact element, and a member mounted on a portion of said cartridge which is engaged by a portion of said contact element for securing said cartridge in the closed position thereof.

3. A contact structure for an electrical cutout of the type having an expulsion cartridge which is adapted to swing automatically to the open position on rupture of a fuse link related to said cartridge and having an insulator for supporting parts of said cutout, said contact structure comprising a supporting member supported by said insulator for supporting said contact structure, a contact element having a loop at one end thereof, means comprising a pin supported by said supporting member

and extended through said loop for attaching said contact element to said supporting member for floating movement, a spring mounted between said supporting member and said contact element which tends to move said contact element in the direction of its length, a second spring mounted between said supporting member and said contact element which tends to move a portion of said contact element in a direction transversely of the length of said contact element, and a member mounted on a portion of said cartridge which is engaged by a portion of said contact element for securing said cartridge in the closed position thereof.

4. A contact structure for an electrical cutout of the type having an expulsion cartridge which is adapted to swing automatically to the open position on rupture of a fuse link related to said cartridge and having an insulator for supporting parts of said cutout, said contact structure comprising a supporting member supported by said insulator for supporting said contact structure, a contact element having a loop at one end thereof, means comprising a pin supported by said supporting member and extended through said loop for attaching said contact element to said supporting member for floating movement, a spring mounted between said supporting member and said contact element which tends to move said contact element in the direction of its length, a second spring mounted between said supporting member and said contact element which tends to move a portion of said contact element in a direction transversely of the length of said contact element, an electrical shunt element which connects said contact element to a part of the cutout, and a member mounted on a portion of said cartridge which is engaged by a portion of said contact element for securing said cartridge in the closed position thereof.

5. A contact structure for an electrical cutout of the type having an expulsion cartridge which is adapted to swing automatically to the open position on rupture of a fuse link related to said cartridge and having an insulator for supporting parts of said cutout, said contact structure comprising a supporting member supported by said insulator for supporting said contact structure, a contact element having a loop at one end thereof, means comprising a pin supported by said supporting member and extended through said loop for attaching said contact element to said supporting member for floating movement, a spring mounted between said supporting member and said contact element which tends to move said contact element in the direction of its length, a second spring mounted between said supporting member and said contact element which tends to move a portion of said contact element in a direction transversely of the length of said contact element, an electrical shunt element formed of flexible material which connects said contact element to a part of the cutout, and a member mounted on a portion of said cartridge which is engaged by a portion of said contact element for securing said cartridge in the closed position thereof.

6. A contact assembly for an expulsion-type fuse cutout having a fuse cartridge, said assembly comprising a supporting structure, a contact element, means for attaching said contact element to said supporting structure so as to permit floating movement of said contact element, a first resilient member interconnecting said

contact element and said supporting structure so as to bias said contact element for substantially longitudinal movement, a second resilient member interconnecting said contact element and said supporting structure so as to bias said contact element for substantially transverse movement, and a member mounted on a portion of said fuse cartridge which is engaged by a portion of said contact element for securing said cartridge in the closed position thereof.

7. A contact assembly according to claim 6, wherein said resilient members are coil springs.

8. A contact assembly according to claim 6, further comprising an electrical shunt element which connects said contact element to a part of the cutout.

9. A contact assembly according to claim 8, in which said electrical shunt element and said means for attaching said contact element to said supporting structure are one and the same.

10. A contact assembly for an expulsion-type fuse cutout having a fuse cartridge, said assembly comprising a supporting structure, a contact element, means for attaching said contact element to said supporting structure so as to permit floating movement of said contact element, a first spring interconnecting said contact element and said supporting structure so as to bias said contact element for substantially longitudinal movement, a second spring interconnecting said contact element and said supporting structure so as to bias said contact element for substantially transverse movement, and a member mounted on a portion of said fuse cartridge and having a contact which is engaged by a portion of said contact element for securing said cartridge in the closed position thereof.

11. A contact assembly for an expulsion-type fuse cutout having a fuse cartridge, said assembly comprising a supporting structure forming a hood, a contact element, means for attaching said contact element to said supporting structure so as to permit movement of said contact element in a plurality of directions, a first resilient member interconnecting said contact element and said supporting structure so as to bias said contact element for substantially longitudinal movement, a second resilient member interconnecting said contact element and said supporting structure so as to bias said contact element for substantially transverse movement, and a member mounted on a portion of said fuse cartridge which is engaged by a portion of said contact element for securing said cartridge in the closed position thereof.

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