June 5, 1956 H. S. BILLINGS, JR 2,749,408

FUSEHOLDER HAVING A SPRING LOADED CAP

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Fig. 1.

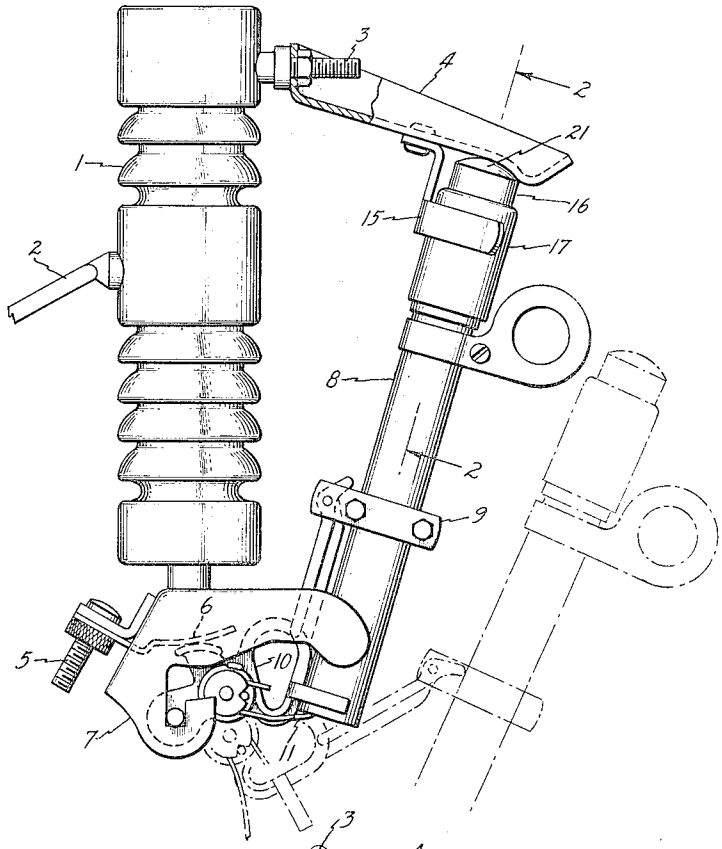
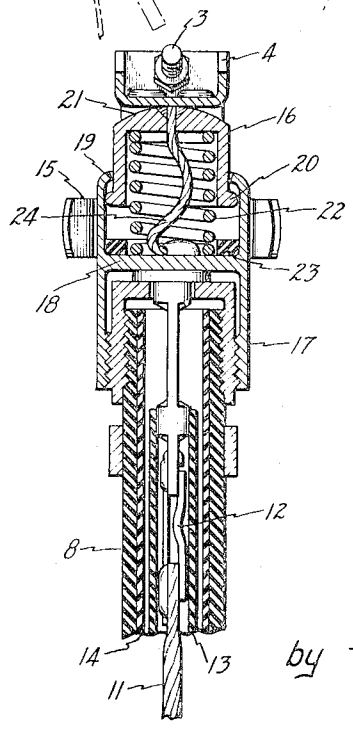


Fig. 2.



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FUSEHOLDER HAVING A SPRING LOADED CAP

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3 Claims. (Cl. 200—127)

This invention relates to a fuseholder or current interrupting means having a spring loaded cap.

In some cutouts, of the open or enclosed type, a tubular member having current interrupting means therein spans two spaced terminal contacts to complete an electrical circuit therebetween. The lower end of said tubular member is open and is pivoted to the lower one of said two terminal contacts whereby the tubular member can be hinged closed and open to make and break said electrical circuit. Said current interrupting means within said tubular member may be an expulsive current interrupting means whereby when said electrical circuit is interrupted by said current interrupting means said tubular member may be caused to recoil towards the upper one of said two terminal contacts.

A plurality of upper terminal contact cantilever type spring latches have been provided for the above described cutouts to latch said tubular member closed, make electrical contact with the upper end of the tubular member, exert a downward force on the tubular member to initiate dropout action thereof, and to absorb some of, but not positively limit, said tubular member recoil. Although said upper terminal contact cantilever type spring latches have served their purposes adequately, said upper terminal contact cantilever type spring latches have been rather expensive and increase the cost of said cutouts; and also, they do not readily afford a positive stop to limit the upward recoil of said tubular member so as to reduce the bending forces on said tubular member normally associated with limiting said recoil at the lower end of said tubular member.

It is an object of this invention to provide a combination current carrying contact recoil absorbing, downward force exerting dropout initiating, latching mechanism cap for a tubular member having expulsive current interrupting means therein whereby when said tubular encased expulsive current interrupting means is used in an enclosed or open type cutout the heretofore mentioned expensive upper terminal contact cantilever type spring latches may be dispensed with, said cap being cooperative with a positive stop to limit upward recoil of the tubular member.

My invention comprises a tubular member having a contact member at one end thereof closing said one end, said contact member having a cylindrical body portion secured to said one end and a cylindrical movable portion telescopically movable with respect to said body portion, said movable portion having one end thereof closed, said portions together defining a spring chamber and a lost motion connection therebetween, and a compressed spring within said chamber continuously urging said movable portion away from said body portion.

The features of my invention which I believe to be novel are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with the accompanying drawing.

In the drawing, Fig. 1 is a side elevation view of one form of my invention. Fig. 2 is an enlarged detail sectional view of the spring loaded cap of Fig. 1 taken along the line 2—2 of Fig. 1. Like reference numerals will be used throughout the various figures to indicate identical parts.

Referring now to the drawing, and more particularly to Fig. 1, illustrated therein is an open type cutout comprising an elongated porcelain or other electrical insulating material support 1 carried adjacent a central portion thereof by a support arm or bracket 2. Mounted adjacent opposite ends of the elongated support 1 are terminal contacts. The upper terminal contact comprises a line connecting terminal 3 and a rigid non-resilient contact latch 4. The lower terminal contact comprises a line connecting terminal 5, a resilient contact 6, and a hinge element 7.

Spanning the two spaced terminal contacts is a fuseholder or tubular member 8 having expulsive current interrupting means therein which is responsive to currents above a predetermined value. The fuseholder or tubular member 8 is pivoted adjacent the lower open end thereof by a toggle mechanism comprising a clamping member 9 and an L-shaped contact member 10. The L-shaped contact member 10 is pivoted at one end thereof to the clamping member 9 and at the other end thereof to the hinge element 7.

The expulsive current interrupting means within fuseholder or tubular member 8 comprises a fuse link 11 having a fusible portion 12 along the length thereof, see Fig. 2, an auxiliary fuse tube 13 surrounding the fusible portion 12, and an internal fiber liner 14. The lower end of the fuse link 11 extends out of the open bottom end of the fuseholder or tubular member 8 and is tautly fastened to the L-shaped contact member 10 with the lower end of the fuseholder or tubular member 8 in abutting relationship with the L-shaped contact member 10.

As will be obvious to those skilled in the art, the fuseholder or tubular member 8 can be hinged closed or open to manually make or break the electrical circuit between the two spaced terminal contacts. When the tubular member or fuseholder 8 is in its closed position, should an overcurrent occur in the electrical circuit between the two spaced terminal contacts, the fusible portion 12 will be automatically ruptured. When the fusible portion 12 is ruptured an electrical arc is established within the fuse tube 13. When the current through said electrical arc exceeds a predetermined value and the hot arc gases thereof bursts the fuse tube 13 said electrical arc and the heat thereof causes a deionizing gas to be evolved from the fiber liner 14. Inasmuch as the upper end of the fuseholder or tubular member 8 is closed, said deionizing gas is expelled out of the lower open end of the fuseholder or tubular member 8. Accordingly, the fuseholder or tubular member 8 is caused to recoil upwardly towards the upper terminal contact.

With the fusible portion 12 ruptured, the lower end of the fuseholder or tubular member 8 is no longer held in abutting relationship with the L-shaped contact member 10. The fuseholder or tubular member 8 is free to be moved downwardly and the L-shaped contact member 10 is free to pivot clockwise. The fuseholder 8 and toggle mechanism will assume the position illustrated in broken-line outline in Fig. 1 whereby the lower broken end of the fuse link 11 attached to the L-shaped contact member 10 will be extracted from the fuseholder or tubular member 8. As the fuse link 11 is extracted from the fuseholder 8 the electrical arc within the fuseholder 8 is elongated. Elongation of said electrical arc in combination with the expulsive action of the deionizing gas within the fuseholder 8 evolved from the fiber liner 14 results in extinguishment of said electrical arc and ulti-

mate interruption of the electrical circuit between the two spaced terminal contacts.

As heretofore explained, some of the prior art upper terminal contacts comprised rather expensive cantilever type spring latches. Said prior art cantilever type spring latches sometimes were quite complicated inasmuch as they had several functions to perform. Besides latching the fuseholder 8 in its closed position, said prior art cantilever type spring latches also had to be designed to initiate downward movement of the fuseholder 8 upon rupture of the fusible portion 12, to insure adequate electrical contact between the upper portion of the fuseholder or tubular member 8 and the upper terminal contact, and to absorb but not limit the upward recoil of the fuseholder or tubular member 8. In my invention the fuseholder 8 is provided with a very simple, inexpensive, and reliable spring loaded cap to perform the aforementioned functions of prior art cantilever type spring latches whereby the upper terminal contact can now comprise a simple and inexpensive rigid non-resilient contact latch 4. Preferably contact latch 4 is constructed with sufficient strength to positively limit recoil of tubular member 8 adjacent the upper end thereof. If so desired, a U-shaped member 15 can be connected to the rigid non-resilient contact latch 4 to steady the fuseholder or tubular member 8 from wobbling laterally during manual opening and closing movement thereof.

Referring now more particularly to Fig. 2, shown therein is my spring loaded fuseholder cap or contact member comprising two cylindrical members 16 and 17. The cylindrical member 17 is open at its opposite ends and has a central interior transverse stop wall 18. The lower end of the cylindrical member 17 is connected to the upper end of the fuseholder or tubular member 8, and placed in electrical contact with a button head or the like of fuse link 11, and the upper end of the cylindrical member 17 has an inturned flange 19 formed thereon. The cylindrical member 16 is open at its lower end and has an outturned flange 20 formed thereon. The upper end of the cylindrical member 16 is closed by a dome-shaped portion 21. Said two cylindrical members 16 and 17 together define a spring chamber, and within said spring chamber is disposed a compressed spring 22. Spring 22 bears at its opposite ends against the stop wall 18 and the dome-shaped portion 21, and continuously biases the cylindrical member 16 outwardly away from the stop wall 18. If so desired, an annular rubber or other resilient material gasket 23 can be disposed within the upper end of the cylindrical member 17 about the lower end of the compressed spring 22 against the stop wall 18. Also, if so desired a current carrying flexible conductor 24 can be disposed within the compressed spring 22 electrically connected at its opposite ends to the stop wall 18 and the dome-shaped portion 21. The cylindrical member 16 is concentrically disposed within the cylindrical member 17 and adapted for telescopic lost motion movement with respect thereto. Upward or outward movement of cylindrical member 16 is limited by the interlocking flanges 19 and 20, and downward or inward movement of the cylindrical member 16 is limited by abutting engagement of the lower end of cylindrical member 16 with the stop wall 18 or annular rubber gasket 23.

As will be obvious to those skilled in the art, when the fuseholder or tubular member 8 is hinged closed, the spring 22 will be compressed slightly and the outturned flange 20 will be moved a short distance away from the inturned flange 19 toward the stop wall 18. Said slight compression of spring 22 will insure good electrical contact between the dome-shaped portion 21 and the rigid non-resilient contact latch 4 as well as good latching engagement therebetween to hold the fuseholder or tubular member 8 in its closed position. Also when the fuse link 11 is ruptured said slight compression of spring 22 will be sufficient to initiate downward movement of the fuseholder 8. Furthermore, when the fuseholder 8 recoils upwardly in reaction to the expulsive action of the circuit interrupting means within the fuseholder 8, the spring 22 will be further compressed to absorb the recoil of fuseholder 8. Ultimately the lower open end of the cylindrical member 16 will abut the stop wall 18 to prohibit further upward recoil travel of the fuseholder 8. The upward recoil forces are then transmitted to the upper portion of insulator 1 through rigid latch 4. When the rubber gasket 23 is used, said gasket will resiliently cushion said further upward recoil travel of the fuseholder 8 thereby cushioning the transfer of the recoil forces to rigid contact latch 4.

While there has been shown and described a particular embodiment of the invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention and that it is intended by the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An expulsion fuse comprising a tubular member open at one end thereof and closed at another end thereof by a combination current carrying contact and latching mechanism cap, said cap comprising another tubular member centrally traversed interiorly thereof by a stop wall, said another tubular member fixed at one end thereof to said closed end, and a movable dome-shaped member movably connected to another end of said another tubular member for telescopic lost motion movement therein, a compressed spring disposed between said stop wall and said dome-shaped member continuously biasing said dome-shaped member for outward telescopic movement away from said stop wall, an endmost portion of said another tubular member another end having an inturned flange thereon cooperative with an outturned flange formed on an endmost portion of said dome-shaped member to limit said outward movement, said tubular member having expulsive current interrupting means therein electrically connected to said another tubular member, said endmost portion of said dome-shaped member cooperative with said stop wall to limit inward telescopic movement of said dome-shaped member towards said stop wall.

2. A current interrupting mechanism comprising two spaced terminal contacts spanned by means for completing an electrical circuit therebetween, said means comprising a tubular member closed at one end thereof and open at another end thereof, said tubular member hinged adjacent said open end to one of said terminal contacts whereby said means can be hinged open and closed with respect to said two spaced terminal contacts to manually break and make said electrical circuit, the other of said terminal contacts having a rigid non-resilient contact latch, said closed end having a combination current carrying contact, recoil absorbing, latching mechanism cap comprising a cylindrical body portion connected to said one end and a cylindrical dome-shaped portion movably attached to said body portion for telescopic movement therein and having a lost motion connection therebetween, said body portion and said dome-shaped portion together defining a spring chamber, a compressed spring in said chamber continuously biasing said dome-shaped portion away from said body portion, said tubular member having expulsive current interrupting means therein whereby when said expulsive current interrupting means interrupts said electrical circuit said tubular member is caused to recoil towards said rigid non-resilient contact latch.

3. An expulsion fuse comprising an electrical insulating material tubular member open at one end thereof and closed at another end thereof by a combination current carrying contact and latching mechanism cap, said combination contact and cap comprising a metallic tubular member centrally traversed interiorly thereof by a stop flange, said metallic tubular member fixed at one end

thereof to said closed end, and another metallic tubular member closed at one end thereof and open at another end thereof and movably connected to another end of said first mentioned metallic tubular member for telescopic lost motion movement therein, a compressed spring disposed between said stop flange and said another metallic tubular member closed end continuously biasing said another metallic tubular member closed end for outward telescopic movement away from said stop flange, an endmost portion of said first mentioned metallic tubular member another end having an inturned flange thereon cooperative with an outturned flange formed on an endmost portion of said another metallic tubular member open end to limit said outward telescopic movement, said electrical insulating material tubular member having expulsive current interrupting means therein electrically connected to said first mentioned metallic tubular member,

said endmost portion of said another metallic tubular member cooperative with said stop flange to limit inward telescopic movement of said another metallic tubular member towards said stop flange.

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