Jan. 26, 1960 R. W. STROBEL ET AL 2,922,863

LOAD BREAK DEVICE

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Fig. 1.

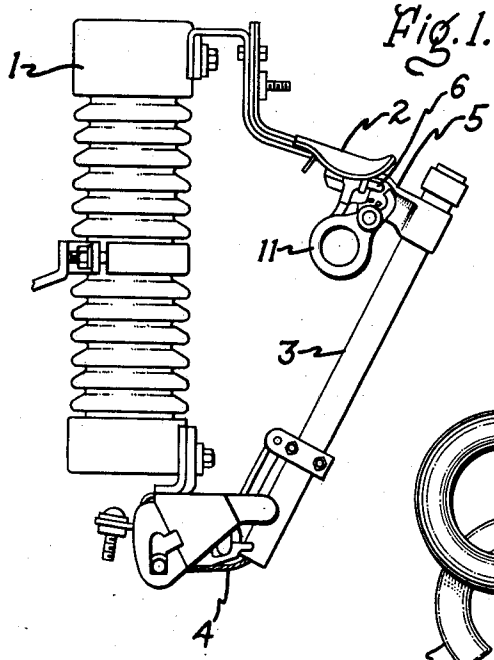


Fig. 2.

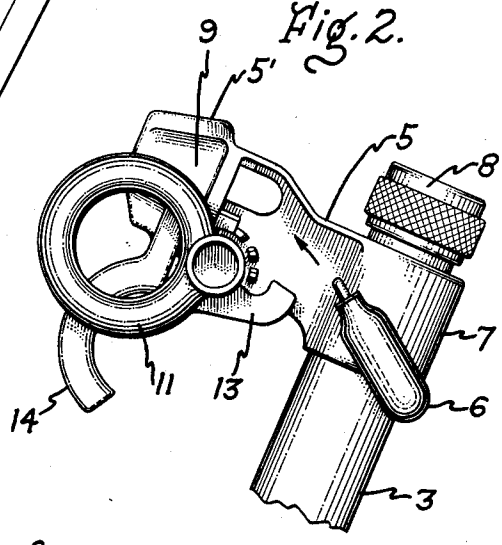
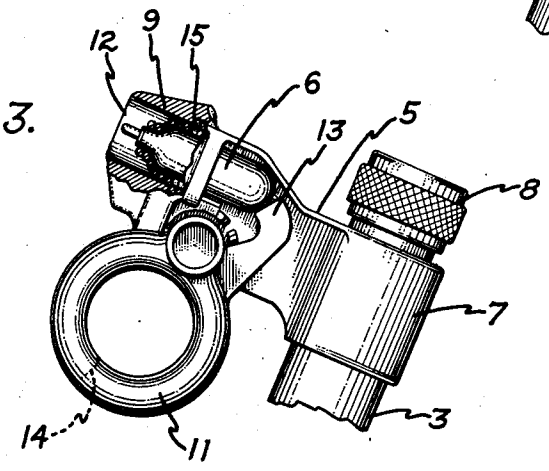


Fig. 3.



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Fig. 4.

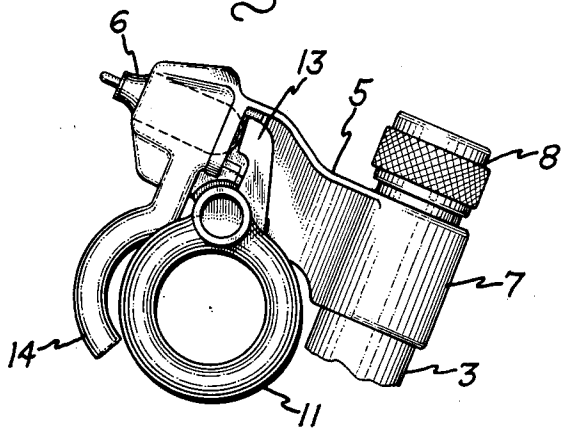


Fig. 5.

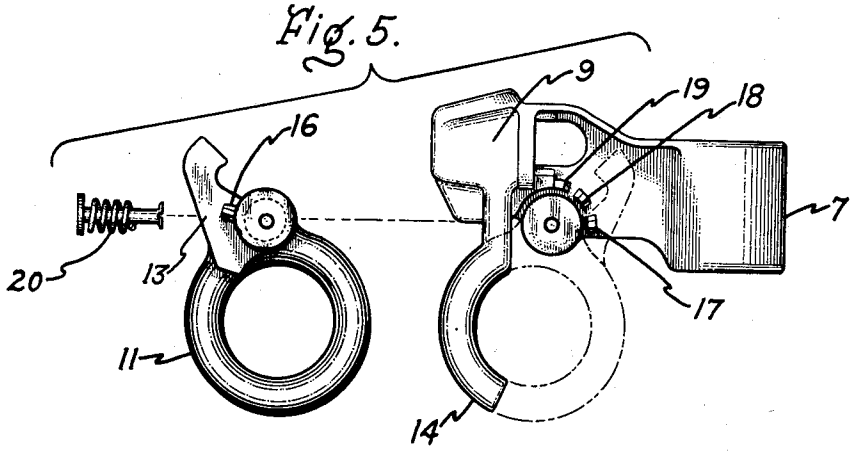
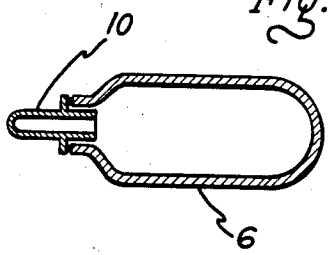


Fig. 6.



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LOAD BREAK DEVICE

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Application September 18, 1958, Serial No. 761,825

4 Claims. (Cl. 200—120)

This invention relates to an improved load break device, and more particularly, to an improved cartridge load break device of the type disclosed and claimed in Charewicz et al. Patent 2,834,856 which is assigned to the same assignee as the instant patent application.

Although the invention will be particularly described with respect to open type fuse cutouts it will be obvious from the hereinafter set forth description of the invention that our improvement is also applicable to fuseless cutouts and not necessarily restricted to open type cutouts but is applicable to other types of switches as for instance disconnect blade switches. Also, while a compressed insulating gas cartridge is particularly shown other forms of electrical arc extinguishing cartridges can be used in the practice of our invention.

It is an object of our invention to provide a cartridge load break device which will never operate prematurely. Premature operation can comprise operation of the load break device when the fuseholder or its equivalent means is being manually moved to close position. Premature operation can also comprise operation of the load break device before the fuseholder or its equivalent means is electrically separated from its upper contact latch.

In the preferred form of our invention the above stated object is attained by forming a housing or holder in the upper contact of the fuseholder. This housing or holder performs as a holder for the cartridge and as a protective housing for the frangible tip of the cartridge. That is to say, the frangible tip of the cartridge is caused to protrude from within the protective housing after which an electrical arc can burn through the tip to initiate the gas blast for breaking the load only when the load break device is intended to operate and at no other time. The means for causing the cartridge to move and the frangible tip to become exposed preferably comprises an eyelet handle which is also the means for opening and closing the fuseholder. In the set position of the load break device a lug or finger formed on the eyelet handle retains the cartridge in the cartridge holder or housing. When it is desired to manually break the load the pull of a switchstick on the eyelet handle will move the cartridge to another position whereby the frangible cartridge tip is exposed so that an electrical arc can play on it. Another lug or stop which is formed on the upper contact of the fuseholder insures that the cartridge does not fall out of its holder and housing when the fuseholder is being manually closed in on its contact latch by pushing in on the eyelet handle with a switchstick.

The subject matter which we regard as our invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. Our invention, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a side elevational view of one form of our invention;

Fig. 2 is an enlarged view of our invention showing how the eyelet handle can be moved out of the way so that a cartridge can be inserted into the cartridge holder;

Fig. 3 is a partly broken away view similar to that of Fig. 2 in which the cartridge has been inserted and a part of the eyelet handle cooperates to hold the cartridge in the cartridge holder;

Fig. 4 is a view similar to that of Figs. 2 and 3 illustrating the position of the parts after the eyelet handle has been pulled to open the fuseholder and cause the cartridge tip to protrude from within the cartridge housing;

Fig. 5 is an exploded view of the upper contact and the eyelet handle to show the cooperating teeth thereon to provide three distinct positions for the eyelet handle, and

Fig. 6 is an illustration of the construction of one form of cartridge which may be used with the invention.

Referring now particularly to Fig. 1 of the drawings, illustrated therein is an open type fuse cutout which comprises an electrical insulator 1, a fixed contact 2, and a fuseholder 3. The contact 2 which is also a resilient latch is mounted on the upper end of insulator 1. The lower end of the fuseholder 3 is pivotally mounted on the lower end of the insulator 1 so that the upper end of the fuseholder 3 can be hinged opened and closed with respect to the latch 2. The fuseholder 3 has a fuse link 4 therein which is one form of an automatic circuit interrupting means.

Our invention resides in those parts of the cutout which are connected to the upper end of the fuseholder 3, and more particularly to the upper fuseholder contact 5. The remaining portions of the cutout are conventional and therefore will not be described in detail inasmuch as their detailed description is not necessary for a full understanding of our invention.

In this form of cutout when an overcurrent occurs, the fuse link 4 is ruptured by the overcurrent. Rupture of the fuse link 4 frees the fuseholder 3 for downward and outward pivotal movement whereby the upper end of the fuseholder is automatically unlatched from the contact 2 for dropout movement. Occasionally, however, it is desirable to manually open the cutout. For instance, one might want to do some repair work on electrical apparatus which is connected to the line and in order to de-energize the line the fuseholder 3 would be manually opened. However, when the fuseholder 3 is manually opened with the line energized an arc is drawn between the contact 2 and the upper end of the fuseholder which is a threat to the safety of the lineman. This is true even though he is working with a switchstick inasmuch as a high wind may blow the arc about. Additionally, it is possible for the arc to be blown to a grounded object which will ground the line current. Also, arcing tends to have a deleterious effect on the cutout parts. If the arc persists even after the fuseholder is separated by a large distance from the contact 2 the fuseholder 3 can be reclosed and the operation repeated. However, typically another heavy arc is merely drawn again due to the load current. The load can be broken by manually breaking the fuse link 4. However, this then requires refusing of the cutout. It is the function of the load break device, and more particularly of the load break cartridge 6 to extinguish the electrical arc which is drawn between the contact 2 and the upper end of the fuseholder 3 when the fuseholder 3 is manually pulled open with a switchstick. The cartridge 6 plays no function whatsoever in automatic short circuit or overcurrent interruption by the cutout. That is to say, an overcurrent is interrupted solely by the fuse link 4 within the fuseholder 3 and the

cartridge 6 does not and is not intended to be fired when the fuse link 4 melts or when the fuseholder 3 drops open as a result of melting of fuse link 4. To put it another way, the cartridge 6 is solely for manual opening of the circuit and the fuse link 4 is solely for automatic opening of the circuit, and these two devices function independently of each other.

Referring now also to Figs. 2–5, the upper end of the fuseholder has contact 5 connected thereto. The right-hand end of the contact 5 has a collar 7 formed thereon so that the contact can be connected to the upper end of fuseholder 3. The upper end of collar 7 is adapted to receive a removable fuseholder cap 8 in a manner well known to those skilled in the art. The contact 5 extends in a direction which is generally perpendicular to the fuseholder 3 toward the contact latch 2 for cooperation with the latter. At its left-hand end contact 5 has a housing or holder 9 for cartridge 6. Contact 5 with its collar 7 and cartridge housing or holder 9 preferably is an integrally cast or molded member in order to reduce costs and have a minimum number of separate parts. However, obviously this is not absolutely necessary in the practice of our invention. The part 9 of fuseholder contact 5 serves as a holder for the cartridge 6 and also as a protector or shield for the frangible tip 10 of the cartridge 6 illustrated in Fig. 6. Portion 5' of contact 5 is the part thereof which makes direct electrical contact with contact latch 2.

Pivotally connected to the contact 5 is an eyelet handle 11. Eyelet handle 11 serves several functions. It is adapted to receive the hook of a conventional switchstick. It is used to manually open and close the fuseholder 3 with respect to the contact latch 2. Additionally, it serves to retain the cartridge 6 in the holder or housing 9. This function is illustrated in Fig. 3. When the fuseholder 3 is pulled open the eyelet 11 serves to move the cartridge 6 forward slightly so that the frangible cartridge tip 10 protrudes from within the forward opening 12 in the holder or housing 9 so that an electrical arc can play on the tip 10 and burn through the same to blast some electrical arc extinguishing gas across the load break arc. To accomplish this function a lug or finger 13 is formed on the eyelet handle 11. When a switchstick is pulled on eyelet handle 11 the lug or finger 13 will shift the cartridge 6 forwardly so that its tip 10 protrudes or is exposed from within the holder or housing 9. This position of the device is illustrated in Fig. 4. The lug 13 may be formed integral with the eyelet handle 11 although this is not absolutely necessary.

Fig. 2 illustrates how the eyelet handle 11 can be pivoted to move the lug 13 out of the way so that the holder or housing 9 can be loaded with a new cartridge 6. When the fuseholder 3 is being closed the tip 10 of the cartridge 6 is not exposed from within holder or housing 9 inasmuch as the switchstick is given a forward and upward thrust in order to close fuseholder 3. When fuseholder 3 is being closed handle 11 is not accidentally rotated in a clockwise direction which would permit cartridge 6 to fall out of its holder 9 inasmuch as the hook of the switchstick will butt up against a stop 14 before handle 11 can ever be rotated clockwise. Stop 14 preferably is integrally formed with the contact 5 similar to collar 7 and holder or housing 9.

In the ready or set position of the load break device illustrated in Fig. 3 the cartridge 6 is continuously urged against the finger 13 by a spring 15 which is positioned inside the holder or housing 9 and surrounds cartridge 6. That is to say, the cartridge 6 cannot accidently slip toward the left-hand end of holder or housing 9 from its position illustrated in Fig. 3 but first the spring 15 must be extended. Of course, the spring 15 could be arranged so that it would first have to be compressed. Spring 15 also serves the function of insuring that the tip 10 is not bodily torn off the cartridge 6 to which it is soldered or otherwise connected when the fuseholder 3 is opened. This is because the spring permits the cartridge to float in its housing. Tip 10 is the last point of electrical contact between the contact latch 2 and the upper end of the fuseholder so that the arc which needs to be extinguished will burn therethrough and have the gas blast directed thereacross. When the tip 10 is protruded from within housing 9 it will not be mechanically torn off cartridge 6 by riding along the under side of the contact latch 2 inasmuch as it is resiliently carried or floated in the housing 9 by virtue of spring 15. That is to say, spring 15 permits the cartridge 6 to wobble slightly so that the tip 10 is not forcibly dragged along the under side of contact latch 2 and torn off the body of cylinder 6 whereby the compressed insulating gas therein is expended before the upper end of the fuseholder ever leaves the contact latch 2.

In the preferred form of our invention snap-action indexing means in the form of cooperating teeth are formed on handle 11 and contact 5 which are loaded or urged toward each other by a compressible spring 20 or other equivalent means so that the correct positions for the eyelet handle 11 are readily discernible and not easily or accidently altered. Referring now to Fig. 5, a single tooth 16 is formed on eyelet handle 11 and three spaced and cooperative teeth 17—19 are formed on contact 5. In the open or loading position of eyelet handle 11 illustrated in Fig. 2 the tooth 16 is positioned below the tooth 17. In the load break ready or set position illustrated in Fig. 3 the tooth 16 is positioned between teeth 17 and 18, and in the cartridge firing position the tooth 16 is disposed between teeth 18 and 19. Inasmuch as eyelet handle 11 and contact 5 are urged toward each other by spring 20, an appreciable amount of force must be used to compress spring 20 before the tooth 16 can ride over the teeth 17 and 18. For this reason the various positions of eyelet handle 11 cannot be accidently and unknowingly changed.

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 therefore, 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 we claim as new and desire to secure by Letters Patent of the United States is:

1. In the combination of a cooperative switch member and fixed contact, said switch member being movably mounted for opening and closing movement with respect to said contact, a load break device for interrupting an electrical arc which is drawn between said contact and said switch member when they are manually separated, said means comprising a replaceable electrical arc interrupting cartridge which is small with respect to said switch member, a protective housing on said switch member for said cartridge, a handle on said switch member for operating said switch member and operating said load break device from a ready set condition to an arc interrupting condition, said handle having different positions for said load break device ready set and arc interrupting conditions, and said different handle positions being delineated by snap-action indexing means for said handle.

2. In a cutout which comprises insulating support means, a fixed contact, and an elongated automatic circuit interrupter means, said fixed contact being mounted on said support means and said elongated interrupter means being pivotally mounted at one of its ends on said support means for hinged operation toward and away from said fixed contact, another contact mounted on the other end of said elongated interrupter means for engagement with said fixed contact, said another contact having a load break device holder formed thereon, a load break device positioned in said holder, said load break device comprising a replaceable electrical arc interrupting cartridge which is small with respect to said

elongated interrupter means and has a frangible tip, and manual operating means for said elongated interrupter means and said load break device, said operating means comprising a switchstick operative eyelet handle which is pivotally mounted on said another contact, said cartridge tip being non-protruding from within said holder, and said handle being operative to cause said cartridge tip to protrude from within said load break device holder when said elongated interrupter means is manually hinged away from said fixed contact.

3. In an open type fused cutout which comprises insulating support means, a fixed contact, and a fusetube, said fixed contact being mounted on said support means and said fusetube being pivotally mounted at one of its ends on said support means for hinged operation toward and away from said fixed contact, another contact mounted on the other end of said fusetube for engagement with said fixed contact, said another contact having a load break device holder formed thereon, a load break device positioned in said holder, said load break device comprising a replaceable electrical arc interrupting cartridge which is small with respect to said fusetube and has a frangible tip, and operating means for said pivotally mounted fusetube and said load break device, said operating means comprising a switchstick operative eyelet handle which is pivotally mounted on said another contact, and snap-action indexing means between said handle and another contact, is one position of said indexing means said cartridge tip being non-protruding from within said load break device holder and in another position of said indexing means said cartridge tip having been moved to

protrude from within said load break device holder by said eyelet handle.

4. In an open type fused cutout which comprises insulating support means, a fixed contact and a fusetube, said fixed contact being mounted on said support means and said fusetube being pivotally mounted at one of its ends on said support for hinged operation toward and away from said fixed contact, another contact mounted on the other end of said fusetube for engagement with said fixed contact, said another contact having a load break device holder formed thereon, a load break device positioned in said holder, said load break device comprising a replaceable electrical arc interrupting cartridge which is small with respect to said fusetube and has a frangible tip, a spring in said holder for retaining said cartridge tip in nonexposed position in said holder, and operating means for said pivotally mounted fusetube and said load break device, said operating means comprising a switchstick operative eyelet handle which is pivotally mounted on said another contact, and snap-action spring loaded indexing means between said handle and said another contact, in one position of said indexing means said cartridge tip being held non-exposed in said holder by said handle and in another position of said indexing means said cartridge tip having been moved to an exposed position with respect to said holder by said handle.

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UNITED STATES PATENTS

2,834,856 Charewicz et al. ---------- May 13, 1958