May 23, 1939. E. M. MEYER 2,159,039

INDICATING FUSE CUT-OUT

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Fig. 1

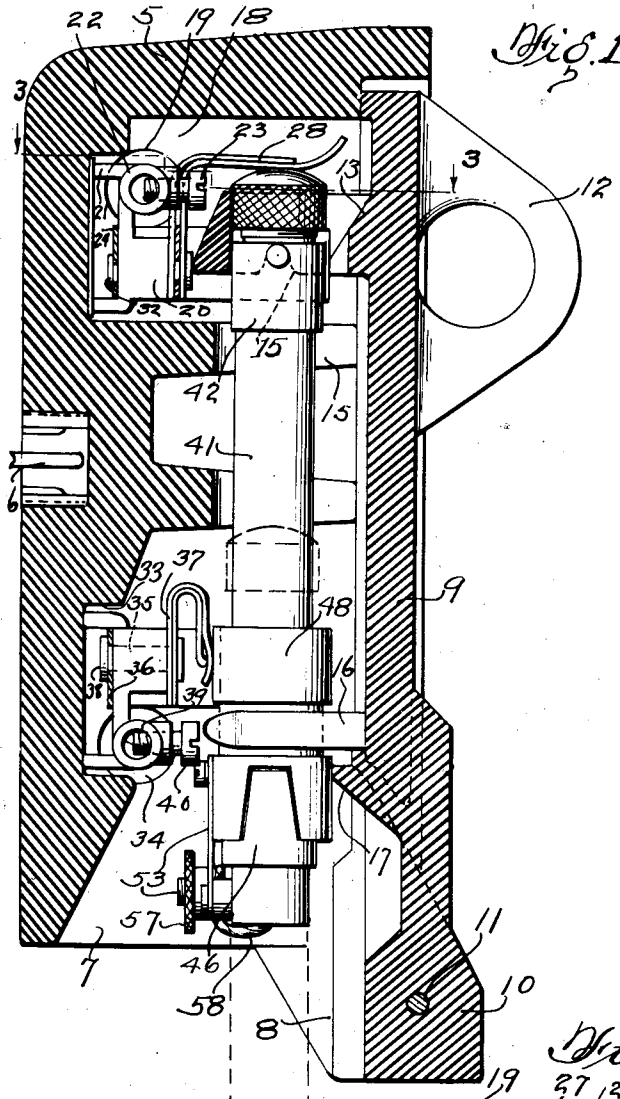


Fig. 2

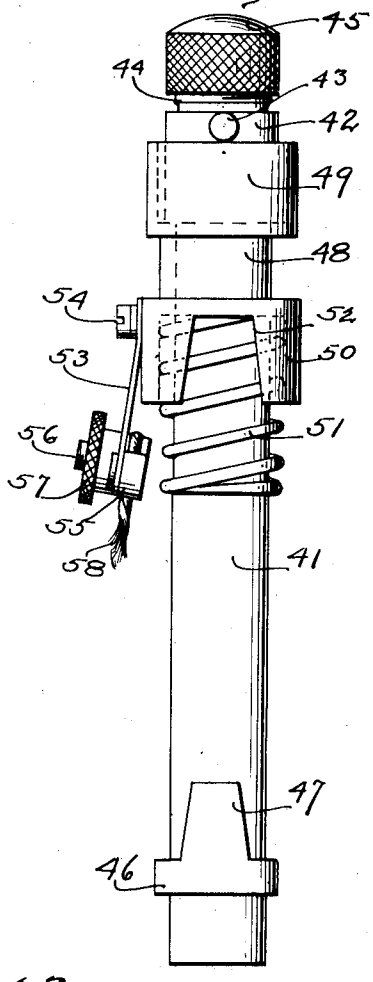
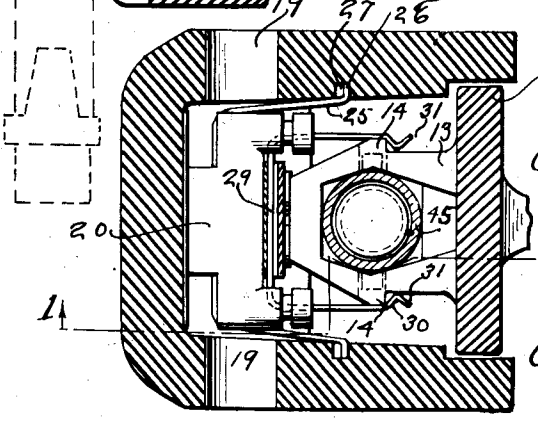


Fig. 3



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2,159,039

INDICATING FUSE CUT-OUT

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7 Claims. (Cl. 200—114)

The invention to which this specification relates is an improvement in the fuse-holders of electrical cut-outs or circuit breakers. Devices of this type are in general holders for the replaceable fusible means and adapted to be inserted in high-tension electric circuits. Under such operating conditions it is essential for these fuses or cut-outs to be located in close proximity to the high tension conductors and as a consequence relatively inaccessible for inspection or maintenance. Therefore, it has been found to be a considerable problem to provide a cut-out having an electric fuse convenient for installation and inspection and at the same time capable of ready removal and replacement.

One of the objects of my invention is to provide a fuse-holder suitable for installation in any one of numerous conventional cut-outs and providing them with peculiar operating advantages.

A further object of my invention is to provide a fuse-holder of this type which will embody mechanical means for effectively and positively breaking the circuit when the fuse link is melted.

Among the objects of my invention is the complete separation of the fuse-holder from one of the conducting terminals by mechanical means and immediately following the melting of the fuse wire.

The fuse-holder embodying my invention has the further advantage of forming an indicator of the "blown" condition of the fuse which will be observable from a considerable distance.

Incidentally, the arrangement of the fuse-holder is such that its installation in the housing will always place it in the exact position necessary for the proper functioning of the fuse as a circuit breaker and indicator.

By way of example, I have shown in the accompanying drawing the preferred form in which my invention may be embodied although minor variations in detail will be readily apparent. As shown in the drawing

Fig. 1 is a side elevation partly in section on the line 1—1 of Fig. 3, of a fuse cut-out containing the improved fuse tube;

Fig. 2 is a side elevation of the fuse tube showing it in the blown or indicating position, and

Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 1.

The general arrangement of the fuse tube and the customary or conventional type of housing is shown in Fig. 1. The housing 5 is of porcelain or other fired plastic or suitably prepared insulating material. This housing is supported by means 6 on a cross arm, wire pole, or other support in the usual manner. The housing has an open or flaring bottom 7 in which the lower end of the fuse tube projects. The front of the housing is open and the sides extended at the bottom to provide spaced ears 8 which form pivotal supports for the cover of the housing.

The cover 9 is formed of insulating material similar or analogous to that of the housing 5. At its lower end 10 the cover is mounted between the members 8 by means of the pivot 11 so that the cover is free to be moved to and from open and closed positions. A finger grip 12 is molded integrally with the cover or attached thereto in any convenient manner. The inner face of the cover has a collar 13 at its upper end. This collar is also formed integrally with the cover or may be attached thereto, in either event being formed of insulating material. The opposite sides of the collar have ears 14, 14.

The lower edges of the sides of the collar have diametrically opposed slots 15, 15 which are open at the bottom.

Suitably spaced beneath the collar 13 is a spring clip 16. The collar 13 and the spring clip 16 extend inwardly of the cover and form supports for holding the fuse-holder. A shoulder 17 extends transversely of the inner face of the cover beneath the spring clip 16 and forms a rest or abutment for the fuse-holder.

The housing has an upper recess 18. This recess has openings through the opposite side walls of the housing to provide passageways 19, 19 through which the insulated wire high-tension conductors are adapted to pass.

Within the recess 18 and between the passageways 19, 19 the housing carries a terminal 20. This terminal has feet 21 which rest against the back wall of the housing and against which the terminal is held. The upper portion of the terminal includes a transverse tube or opening registering with the passageways 19, 19 and adapted to receive the end of the conductor through either passageway. The conductor or cable is held firmly within one end of the tube 22 by means of one of the binding screws 23.

A resilient metal strap 24 extends across the base of the casting 20 and its ends are bent outwardly to form a yoke 25. The ends 26, 26 of the yoke snap into recesses 27, 27 in the side walls of the housing as shown in Fig. 3. In this manner the casting 20 is held in firm position with its feet 21 against the back of the housing 5.

The front face of the casting 20 forms the support for two resilient conducting strips 28 which form the contacting member engaging over the

end of the tube holder. Intermediate the strips forming the conducting member 28 there is provided a resilient yoke 29. This yoke has a pair of hook portions 30, 30 with flaring ends 31. As shown in Fig. 3 these hook portions 30 serve to snap over the ears 14 and thus hold the cover in closed position. The cover of course may be opened by the exertion of a definite pull on the finger grip 12 but otherwise the cover is free from the probability of accidental opening. A rivet 32 passes through the casting 20 and holds it firmly in contact with the members 24, 28 and 29.

The housing 5 is provided with a lower recess 33. This recess has openings 34 extending through the side walls of the housing in the same manner as the openings 19.

A casting 35 is mounted within the recess 33 and held in position by means of a yoke 36 operating in the same manner as the yoke 25.

The casting 35 carries on its front face a laminated resilient contact member 37 as shown in Fig. 1. The yoke 36 and contact member 37 are held upon opposite faces of the casting 35 by means of a rivet, stud or the like 38.

The electric conductor which forms the continuation of the one connected to the tube 22, passes through an opening 34 and is attached to the lower terminal 35 by means of the tube 39 and a screw 40.

In a device of the above type, the fuse is adapted to be held in the cover and to bridge the gap between the contact members 28 and 37. In the form of my invention illustrated, this fuse means comprises an insulating fiber or similar tube 41 and its associated parts. The upper end of the tube 41 carries a ferrule of metal or the like 42. This ferrule is generally cylindrical in form and firmly attached to the tube 41. The ferrule has diametrically extending lugs 43 which, as shown in Fig. 1, are adapted to seat the ferrule within the collar 13 and thus assure the proper positioning of the tube 41.

The ferrule is hollow and its upper end externally screw-threaded as shown at 44 in Fig. 2. A cap 45 is screwed on the thread 44 and against the button-end of the fuse element or wire. The end of the cap 45 is generally spherical for easy engagement and contact with the spring contact member 28.

The lower end of the tube 41 is open. Spaced a short distance from this open end the tube carries a collar 46. This collar is firmly attached to the tube. On opposite sides of the tube the collar has upstanding lugs 47 which are spaced slightly from the surface of the tube 41 to receive an expansion spring.

A sleeve 48 surrounds the tube 41 and has a sliding fit thereon. The tube may slide within the sleeve limited only by the positions of the ferrules 42 and 46.

The upper end of the sleeve 48 is enlarged to form a cup 49 of sufficient size to permit the main portion of the ferrule 42 to drop within the cup 49 until the end of the former is stopped by the lugs 43 as shown in Fig. 2.

The lower end 50 of the sleeve 48 is similarly enlarged to form another cup also spaced from the tube 41. An helical expansion spring 51 is carried within the cup 50 and fits loosely over the tube 41 as indicated in Fig. 2. It will be seen that the sleeve 48 thus has a medial portion of minimum diameter between the cups 49 and 50.

The cup 50 is mutilated on opposite sides to form recesses 52 conforming in shape to the lugs 47 on the collar 46. The lugs 47 fit within the recesses 52 in the position of the parts shown in Fig. 1.

The cup-shaped end 50 of the sleeve 48 may be polygonal in cross-section to provide one face upon which is supported a leaf spring 53 by means of screws or other attachments 54.

The spring 53 normally extends outwardly from the sleeve in the position shown in Fig. 2. The end of the spring carries on its inner face a binding post 55 which has a screw-threaded portion 56 running through the spring and carrying a knurled nut 57 outwardly thereof. The fuse wire running from the button-end beneath the cap 45 passes through the open end of the tube 41 and is fastened to the binding post 55 while the spring 51 is compressed and the collar 46 maintained in contact with the end of the cup 50. The fuse 58 may, if desired, be wrapped around 56 and clamped between the nut 57 and spring 53.

In this position the binding post 55 forms a latch over the end of the collar 46 and with the fuse wire, serves to hold the spring 51 compressed. The binding post 55 remains in this position as long as the stranded fuse wire 58 is unbroken. In this position the force of the spring 51 is sustained by the binding post 55 and the spring 53.

In the assembly and use of this device, it will be understood that the fuse holder is loaded by threading the fuse wire 58 through the ferrule 42 and out of the lower end of the fuse tube 41. The sleeve 48 and the collar 46 are brought together compressing the coil spring 51. In this movement the lugs 47 fit in the recesses 52 and thus establish the position of the sleeve 48 which carries the spring 53 in such manner that the latter will be in a plane parallel to the diameter through the lugs 43. As the lugs 47 fit the recess 52 the collar 46 passes beyond the binding post 55 and the latter is latched over the collar. The fuse wire 58 is then wrapped around the binding post 55 or the threaded shank 56 and tightened against the spring 53 by means of the knurled nut 57. In this way the tension of the fuse wire 58 on the spring 53 maintains the latter parallel to the tube 41 with the binding post 55 forming a latch for the collar 46. The fuse-holder thus holds the ferrule 42 at its most remote position from the slidable sleeve 48.

In its armed and loaded position the fuse holder thus described is adapted to be held on the inner face of the cover 9. When so armed the lugs 43 of the fuse holder fit in the recesses 15 of the collar 13 and the sleeve 48 is then in a proper position to fit within the spring clip 16. The spring clip 16 fits in the portion of the sleeve 48 which has a minimum diameter with one cup-shaped end 49 above and the other end 50 below. These cup-shaped ends prevent material longitudinal movement of the sleeve with respect to the spring clip 16. It will be seen that the position of the lugs 43 within the recesses 15 brings the spring 53 and the knurled nut 57 on the side of the tube 41 opposite from the cover 9.

The fuse holder having been thus mounted within the collar 13 and the clip 16, the cover 9 is swung into closed position. As evident from Fig. 3 the flaring ends 31 of the latch 30 ride over the ears 14 of the collar 13 to form a fastening for the latter. At the same time the cap 45 is brought into good conducting engagement with the spring contact 28. The opposite contact 37 rests under tension against the cup-shaped end 49 of the sleeve 48.

In this position current reaching terminal 20,

for example, passes through the spring contact 28, the cap 45, the fuse wire 58, leaf spring 53, sleeve 48, spring contact 37, casting 35 and finally to the conductor in the tube 39.

The fuse link or wire 58 is of course calibrated for the desired current rating. Until this rating is reached, the current flows freely through the device.

As soon as this rating is exceeded fuse wire 58 melts and releases the tension of the spring 53. This leaf spring thereupon flies outwardly to its normal position as shown in Fig. 2. This releases the collar 46 and the expansion coil spring 51 gives a positive and consequential downward movement to the tube 41.

The immediate result of this movement is to release the upper ferrule 42 from its attachment in the collar 13 and cause the cap 45 to break contact with the member 28. This effectively breaks the circuit.

At the same time, as there is nothing to hold the tube 41 in its upper position it will drop by gravity until the lugs 43 strike the cup 49. By this time the free end of the tube 41 together with the collar 46 will extend beneath the flaring end 7 of the housing and be readily apparent to casual inspection from a distance.

The blowing of the fuse does not affect the position of the cover. This remains closed until opened manually or by a hooked pole. When the cover is opened the fuse holder is carried on the clip 16 away from the housing and out of contact with the spring contact 37. It is then possible to slide the tube 41 toward the collar 13. The extent to which the cover is then opened will permit re-loading of the fuse holder with a new fuse without removal from the cover. However, if more convenient, the sleeve 48 can be separated from spring clip 16 and the fuse holder thus removed for replacement by a fresh fuse or reloading and re-installation.

The advantages of this form of fuse holder will be evident from the above description, without further elaboration. The device is marked by the facility with which it may be manufactured, installed and maintained. It is also capable of considerable variation in design and proportions without departing from the scope of the invention as defined in the following claims.

What I claim is:

1. A fuse tube comprising an insulating tube, a ferrule on one end of the tube, a collar surrounding the tube and spaced from the opposite end thereof, a sleeve slidable over the tube between the ferrule and collar, said sleeve having an enlarged internal recess at one end for receiving the ferrule, means releasably holding the collar and sleeve in engagement, and tension means for separating the collar from the sleeve and moving the tube through the sleeve.

2. A fuse tube comprising an insulating tube, a ferrule on one end of the tube, a collar surrounding the tube and spaced from the opposite end thereof, a lug on the collar spaced from the tube, a sleeve slidable over the tube between the ferrule and collar, a recessed end for the sleeve, said end being notched to receive the lug of the collar, means releasably holding the collar and sleeve in engagement, and tension means for separating the collar from the sleeve and moving the tube slidably through the sleeve.

3. A fuse tube comprising an insulating tube, a ferrule on one end of the tube, engaging lugs on the ferrule, a collar surrounding the tube and spaced from the opposite end thereof, a lug on the collar spaced from the tube and in the same plane with the said engaging lugs on the ferrule, a sleeve slidable over the tube between the ferrule and collar, a recessed end for the sleeve, said end having a notched portion to receive the lug of the collar, means on the sleeve laterally of said notched portion for releasably holding the collar and sleeve in engagement, and tension means for separating the collar from the sleeve and moving the tube slidably through the sleeve.

4. In combination with a housing having a cover therefor with two spaced attaching means, a fuse holder comprising a tube having a ferrule releasably held by one of said attaching means, a sleeve slidable over the tube and held by the other attaching means, a collar on the tube and spaced from the ferrule, means releasably holding the collar and sleeve in engagement, and tension means for separating the collar from the sleeve and for moving the tube away from the first named attaching means.

5. A fuse holder comprising an insulating tube, a ferrule on one end of the tube, engaging lugs on the ferrule, a cap for removably closing the end of the ferrule, a collar surrounding the tube and spaced from the opposite end thereof; a lug on the collar extending longitudinally of the tube and spaced therefrom; a sleeve slidably mounted on the tube between the ferrule and the collar, said sleeve having a central portion of reduced diameter, one end of the sleeve having an enlarged internal recess receiving said ferrule, the opposite end of the sleeve being notched to fit the lug on the collar and having an enlarged internal recess, a coil spring held in said last named recess, a leaf spring mounted on the side of the sleeve and a latch and a binding post on the leaf spring.

6. A fuse cut-out comprising a housing, a cover hinged to the housing, a collar attached to the cover and having recesses, detents on the periphery of said collar, latches mounted within the housing and engaging the said detents, a spring clip on said cover spaced from the said collar, a sleeve held by said clip, a fuse tube slidable in said sleeve, a ferrule on one end of the tube, lugs on the ferrule engaging the recesses in said collar, a second ferrule on the opposite end of the tube, said second named ferrule having guides slidable through the sleeve, a coil spring between the sleeve and the second ferrule, a spring-held latch on the sleeve, a fastening on the latch and a fuse link attached thereto for holding said latch over the second named ferrule.

7. In combination with a housing having a cover therefor with two spaced attaching means, a fuse holder comprising a tube having a ferrule enclosed by one of said attaching means, a sleeve slidable over the tube and held by the other attaching means, a collar on the tube and spaced from the ferrule, means releasably holding the collar and sleeve in engagement, and tension means for separating the collar from the sleeve and exposing the end of the tube with the collar outside the housing.

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