

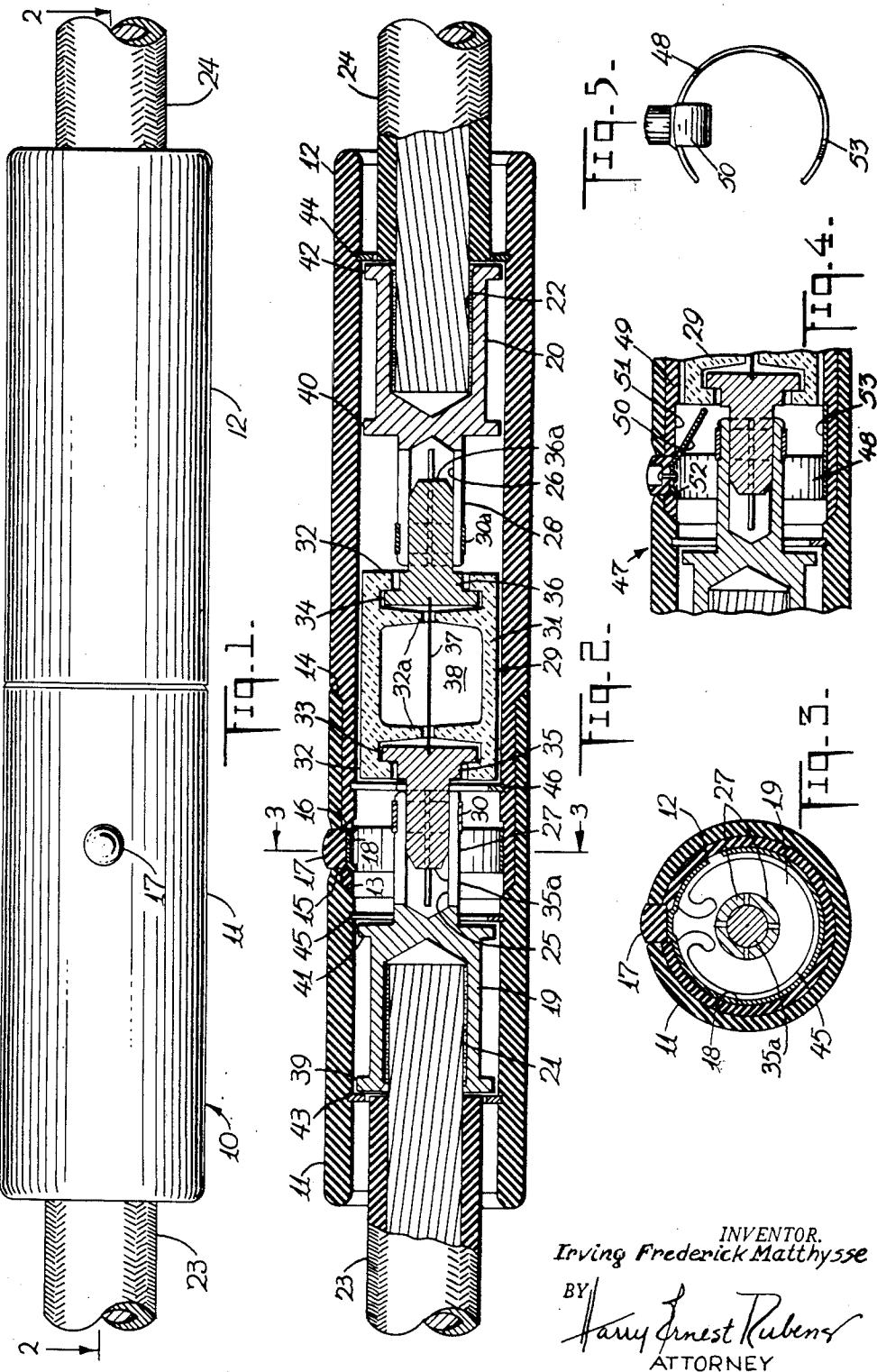
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SLEEVE DISCONNECTOR LOCKING MEANS

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SLEEVE DISCONNECTOR LOCKING MEANS

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This invention relates to an improvement in a locking means for a connector and more particularly to a locking means which will permit a connector to be readily disconnected to replace the branch conductor or to replace the fusible element that may be contained therein. The application is a continuation-in-part of my application Serial No. 99,485 filed June 16, 1949 now Patent No. 2,668,211, dated February 2, 1954.

In the motion picture industry it has been the practice to provide a portable spider distribution box connected to the main panel by a feeder cable, for connecting a plurality of branch illumination circuits. In this system whenever a fault occurred in one of the branch circuits, the circuit breaker at the panel would respond to de-energize the entire system causing a complete stoppage of work on the set until the fault was located and corrected. This delay was costly, as it involved the time of a large group of people. Frequent changes on the set necessitated constant relocation of the branch circuits which caused them to become twisted and ensnared. When it was necessary to replace one of the branch circuits, the line had to be disconnected at the spider box which was not provided with a quick disconnect means.

Additionally, in distribution systems, particularly in underground secondary systems, current faults have burned through the cable and caused permanent damage by destroying many feet of insulation and in some instances, volatilizing the lead from the cable sheathing, assisting in the maintenance of the arc from the short circuit condition. The current limiters that have been used to correct this condition have been found to be dangerous to personnel and equipment when the fusible element was disconnected. These types of limiters were also difficult to replace especially in restricted positions and did not provide for rotary movement of the limiter-conductor assembly within the connector body.

It is therefore a primary object of my invention to provide a locking means for a connector having a replaceable element which functions as a fuse and as a means for disconnecting the circuit.

A further object of my invention is to provide a locking means for a connector having an internal assembly, to which the conductors are attached that will permit the conductors to rotate independently of each other, preventing the twisting of the conductors.

A still further object of my invention is to provide a locking means for a connector body with locked overlapping sleeve portions, for quickly separating the portions.

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Additional objects of my invention are to provide a locking means for a connector that can be electrically separated when the sleeve portions are in an overlapped position to confine any arcing arising from the electrical separation of the parts; to provide such locking means for a connector containing within the sleeve portions rotatable members to support the conductors and to resiliently engage the fuse assembly; to provide quickly releasable means to lock the supporting members within the sleeve portions; to provide the locking means for the fuse assembly with an arc proof housing within the connector body to support a fusible element; and to provide a locking means for a connector having a fuse assembly that is contained within one of the sleeve members and quickly releasable means to lock the fuse assembly therein.

An additional object of this invention is to provide a means to lock together the sleeve members which simultaneously functions as a retaining means for the fuse assembly.

I accomplish these and other objects and obtain my new results as will be apparent from the device described in the following specification, particularly pointed out in the claims, and illustrated in the accompanying drawing, in which—

Fig. 1 is a side elevation view of the current limiter.

Fig. 2 is a longitudinal sectional view taken along line 2—2 of Figure 1.

Fig. 3 is a transverse sectional view taken along line 3—3 of Figure 2.

Fig. 4 is a partial longitudinal sectional view showing a modified locking spring for the sleeve member and fuse assembly.

Fig. 5 is a side elevation view of the modified locking spring.

Referring to the drawing, 10 represents the hollow limiter housing of insulating material comprising a female sleeve 11 adapted to telescopically receive the male sleeve 12, the lapped portion of each sleeve being of sufficient length to confine the arc caused by the separation of the internal contacts, preventing damage to nearby personnel and equipment. In the remainder of the description, the even numbered parts refer generally to the same half of the device.

The lapped portions of the sleeves are provided with a mating recess and corresponding shoulder 13 and 14 respectively to limit the longitudinal movement and to provide a flush fit of the sleeves. Aligned apertures 15 and 16 are provided in each of the lapped portions of the sleeves to receive the head of the locking

button 17 secured to one end of the flat circular split spring 18 which is retained in the male sleeve by spring pressure as shown in Fig. 3. The locking button is located in the female sleeve adjacent the end of the recessed portion of the male sleeve, as far removed as possible from the point of separation of the sleeves. To release the telescopic sleeves, the locking button is depressed to a point where it extends within the aperture 16 of the male sleeve and a simple longitudinal pull on the sleeves will separate the sleeves for access to the inner assembly of the limiter.

Positioned within the telescopic sleeves 11 and 12 are the disconnect socket members 19 and 20, which may be identical in structure, having drilled recesses 21 and 22 respectively, at the outer ends thereof to receive the bared ends of the conductors 23 and 24 which are soldered or otherwise attached therein, with the insulation of the conductor extending within the hollow sleeves. At the other ends of the socket members 19 and 20, recesses 25 and 26 respectively, are provided, the latter ends of the socket members being slotted to form resiliently extending prongs 27 and 28 respectively, to receive the ends of the fusible element assembly 29. Split C springs 30 and 30a respectively are mounted around the split prongs 27 and 28 to provide additional resiliency.

The fusible element assembly 29 comprises a split housing 31, made of an arc-proof asbestos compound, provided with spaced annular flanges 32 and 32a at each end to fixedly receive the shoulders 33 and 34 of the plugs 35 and 36. The plug ends 35a and 36a are received in their respective contact sockets 25 and 26 and yieldable engaged therein by the prongs 27 and 28 respectively for good electrical contact. The yielding prongs further provide a swivel connection between socket members and plugs to permit the conductors to rotate independently of the fusible element. One end of the fusible element 37 is mounted in each plug and extends across the arcing chamber 38 formed by the flanges 32a and the wall of the housing.

It should be noted that the plug end 35a extends from within the male sleeve short of the end thereof similar to the ends of prongs 27 of socket 25 which are contained within their respective sleeve member in the event the connector is separated when energized. When the limiter sleeves are moved apart, electrical contact between the plug and socket will be broken while the limiter sleeves are still in lapped relationship, thus confining within the limiter any arc that may be formed during the disconnecting movement.

The disconnect socket members 19 and 20 are freely mounted within their respective sleeves and are provided with oppositely positioned sets of annular supporting flanges 39, 41 and 40, 42 respectively. The socket 19 mounted within the female sleeve 11 is retained in position at one end by a removable retaining ring 45, each ring seated within an inner annular recess in the sleeve forming an abutment for the flanges 39 and 41 respectively to restrain longitudinal motion, but to permit rotation of the socket within the sleeve. Disconnect socket 20 and fusible element assembly 29 similarly are freely mounted within the male sleeve 12 and are restrained from longitudinal motion by a fixed retainer ring 44 and a removable retaining ring 46. The removable retaining rings 45 and 46 are of flat

spring stock circular in configuration, as shown in Figure 3, and have inturned ends to facilitate removal by use of a suitable tool.

Thus the disconnect sockets and the fusible element assembly are freely mounted in the limiter sleeves and while prevented from longitudinal movement by the retaining rings, can rotate within the sleeves as a unit, so that in the event the sleeves are wedged in a restricted position or the line snarled, the conductors can rotate independently of the sleeves to prevent strain.

When a fault current has occurred the fusible element assembly is replaced by first depressing the locking button sufficiently to permit separation of the sleeves. Upon the female sleeve 11 being sufficiently displaced, the end plug 35 is freed from the contact socket 25, for the fusible element assembly is retained within the male sleeve 12 by removable retaining ring 46. To remove the blown fusible element assembly, the removable retaining ring 46 is compressed by drawing the ends together, permitting the fusible element to be withdrawn and a new fusible element assembly installed.

When it is desired to change the conductor leading to one side of the limiter, the sleeves are separated by depressing the locking button and the new conductor assembled to the desired sleeve, the sleeves being reconnected to complete the connection.

In Fig. 4 I have illustrated a modified current limiter 47, the parts of which may be similar to the ones illustrated in Figs. 1, 2 and 3, with the exception of the circular split locking spring 48 and a modification of the male sleeve 49 within which it is seated. By forming a laterally and obliquely extending resilient finger 50 on the locking spring 48 to engage the fusible element assembly 29, I can omit the locking ring 46, as shown in Fig. 2, which is necessary in that construction to maintain the fusible element assembly in fixed position when the connection is separated. The male sleeve 49 is provided with a recess 51 having a depth that will accommodate the finger 50, as it is deflected outwardly by the repairman with any suitable instrument when it is necessary to replace the fusible element assembly. The finger 50 will automatically be similarly deflected in the recess 51 as the fuse assembly is inserted into position from the outer end of the male sleeve. When the fuse assembly is fully positioned within the sleeve the finger 50 will be released to snap back into an engaging position. The recess 51 extends beyond the outer side of the spring and functions to accommodate a lip 52 on the spring which maintains the button in position in the male sleeve member. As it is more convenient in production to ream the male sleeve to form the recess 51, a base extension 53 may be provided and positioned in the annular recess to give the spring greater lateral stability.

By fixedly housing the rotatable fuse assembly within one sleeve member of the limiter, an end portion of the fuse assembly can function as a disconnect means between the component parts of the limiter, and permit replacement of the fuse element when blown. By providing limiter sleeves having long lapped portions, the connector can be electrically disconnected when the sleeves are still lapped, thereby preventing exposure of any arc that may be formed by the electrical separation. I further reduce the possibility of extensive arcing caused during separation by providing a quickly unlockable means, between the

limiter sleeves which means is positioned remote from the point of separation of the limiter. By providing socket members rotatable and resiliently mounted in each of the limiter sleeves, which may be secured at their ends to the conductors, I can obtain a relative safe rotational movement between the conductors, the limiter body and the fuse assembly thereby preventing the conductors from twisting and ensnaring the cables. Further in the modification illustrated, I can simplify the separation of the fuse assembly from its sleeve and simultaneously omit a part of the device, by incorporating the function of the outermost retaining ring for the fuse assembly in an extension on my locking spring. This extension need only be deflected to enable the fuse assembly to be withdrawn.

I have thus described my invention, but I desire it understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention, and, therefore, I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which, objects of my invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

I claim:

1. A locking means for an electrical connector having a plurality of overlapping sleeves and a

rigid removable element having electrical connections positioned in only one of said sleeves, said locking means comprising an engaging portion positioned between the overlapped sleeves for locking the two sleeves together, a supporting portion positioned in the sleeve containing the removable element for supporting the engaging portion, and an extension laterally projecting radially and inwardly of said sleeve from said supporting portion and adapted to engage and retain the removable element inside one of said sleeves when said sleeves are separated.

2. The locking means of claim 1, wherein the supporting means comprises a resilient sleeve compressible to unlock the sleeves, and the retaining extension projecting therefrom is resilient for deflection out of the path of the removable element when said element is removed.

3. The locking means of claim 2, wherein the sleeve and retaining extension are made from a single piece of sheet metal.

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