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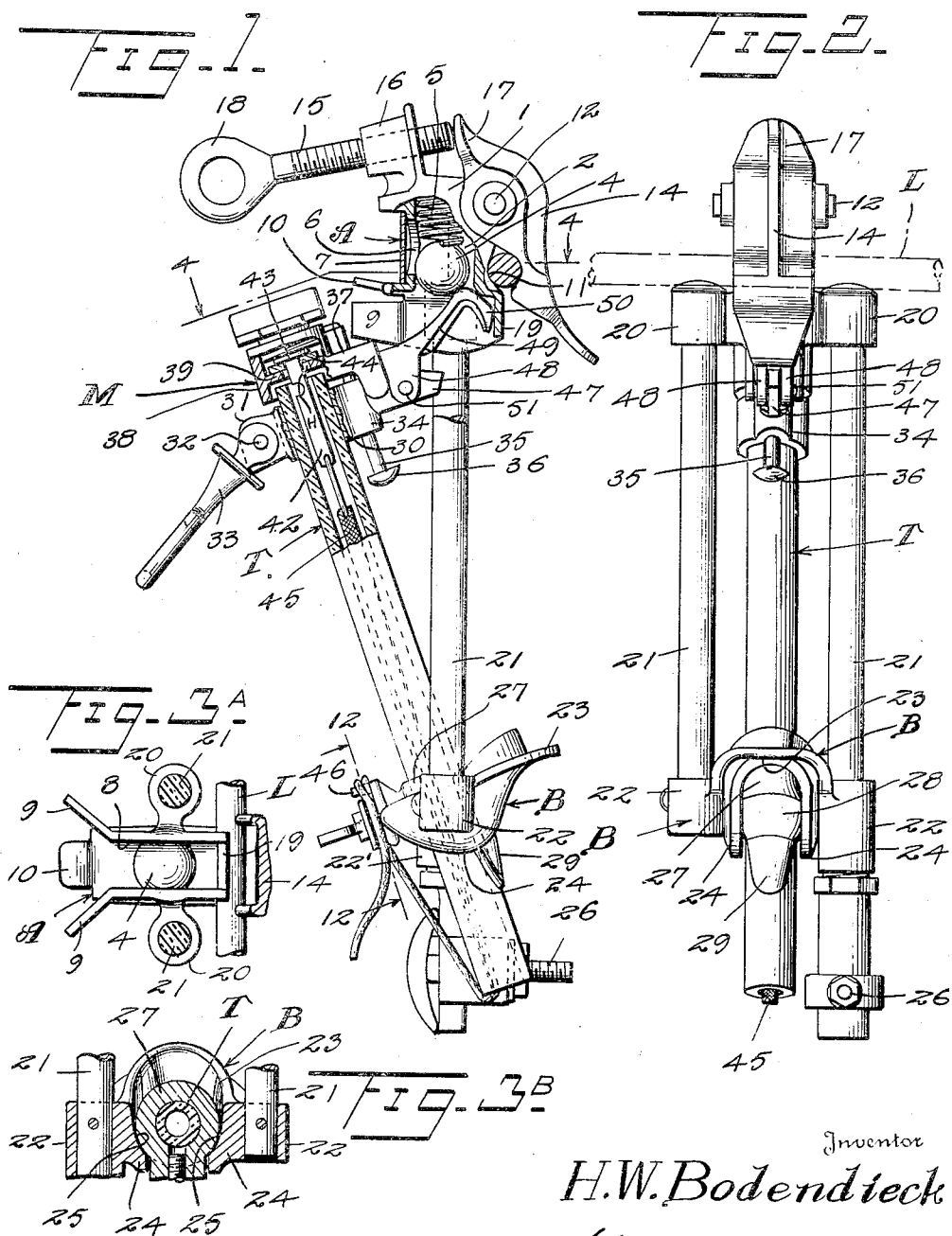
H. W. BODENDIECK

2,212,632

FUSE DEVICE

Filed May 8, 1937

4 Sheets-Sheet 1



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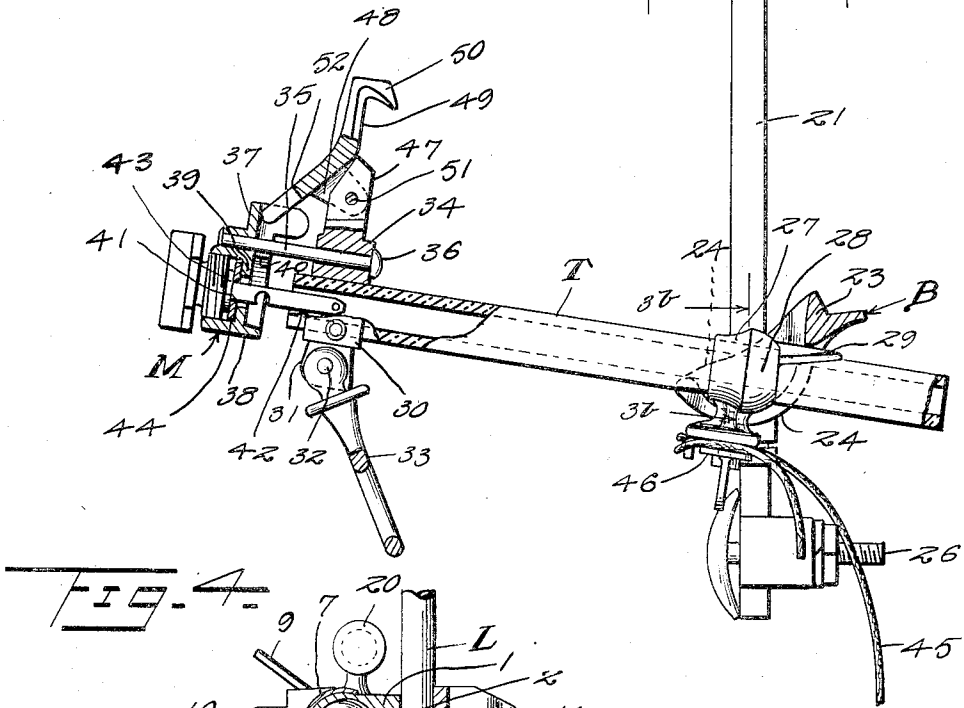
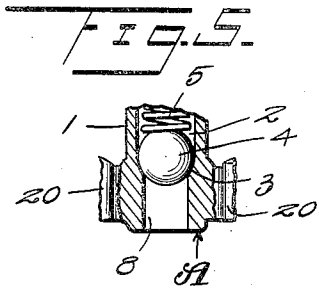
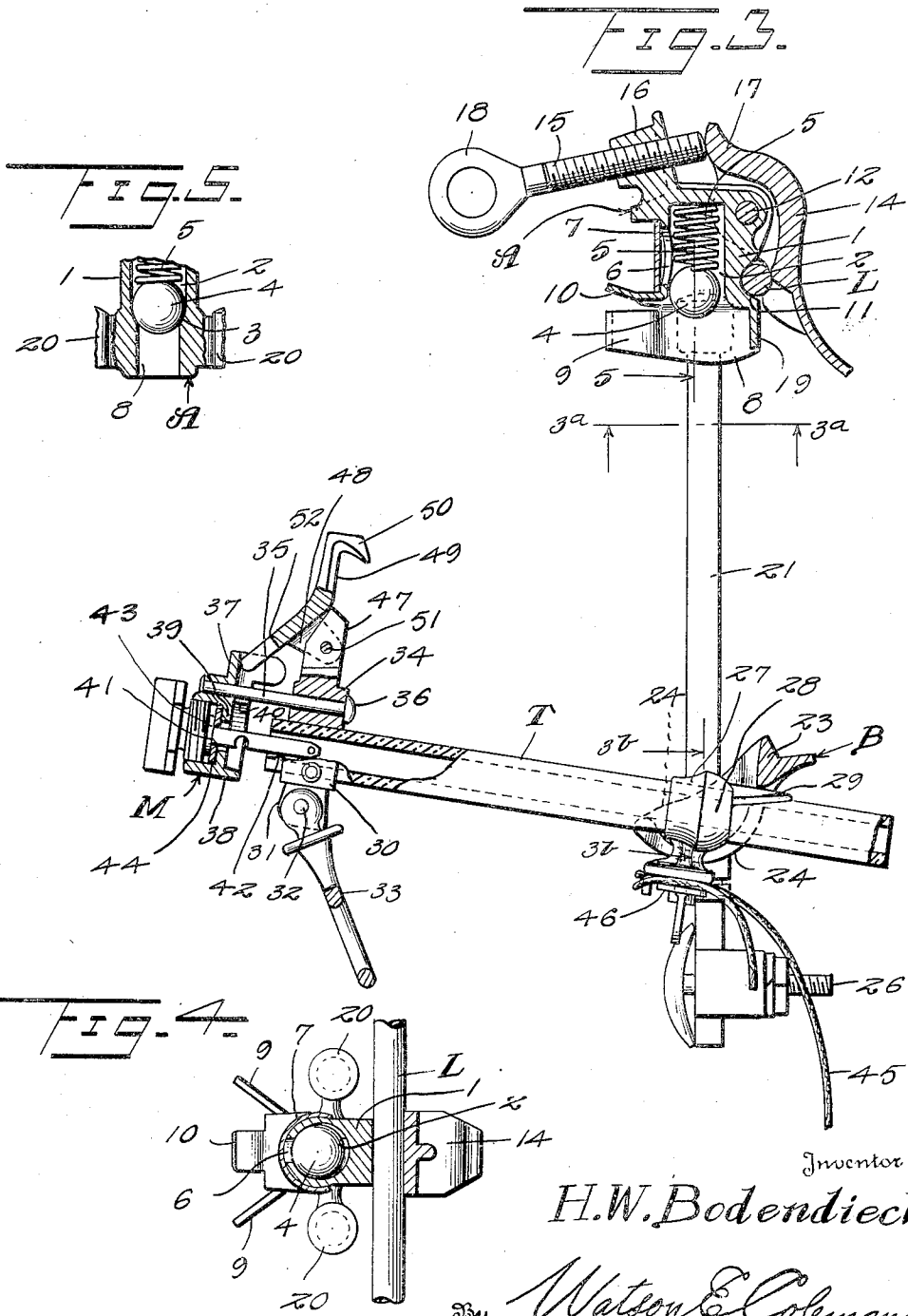
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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

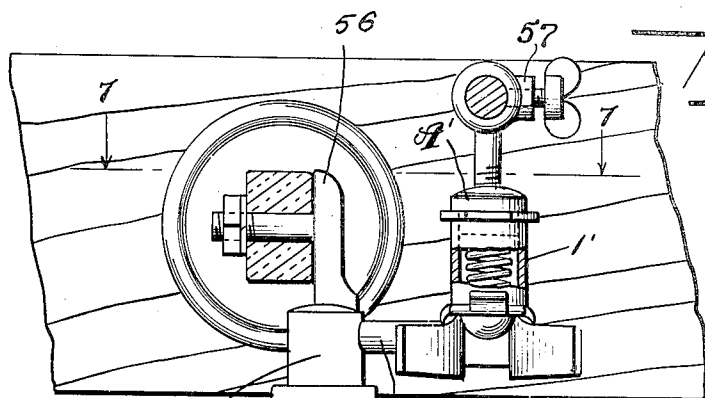


Fig. 6.

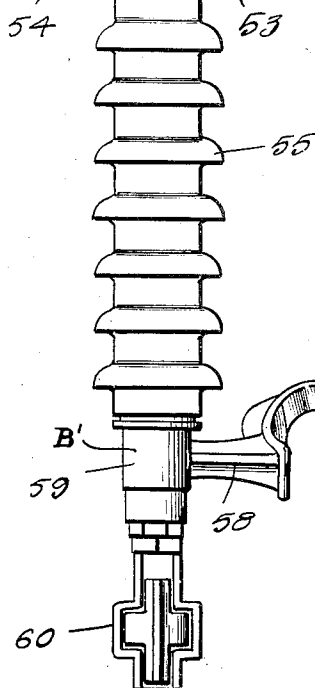


Fig. 7.

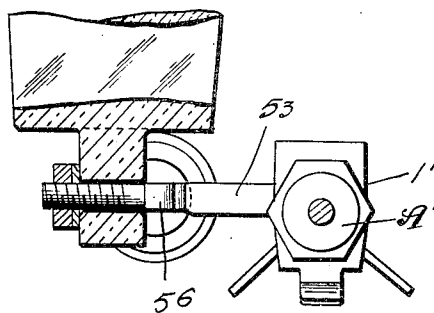
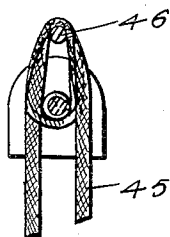


Fig. 12.



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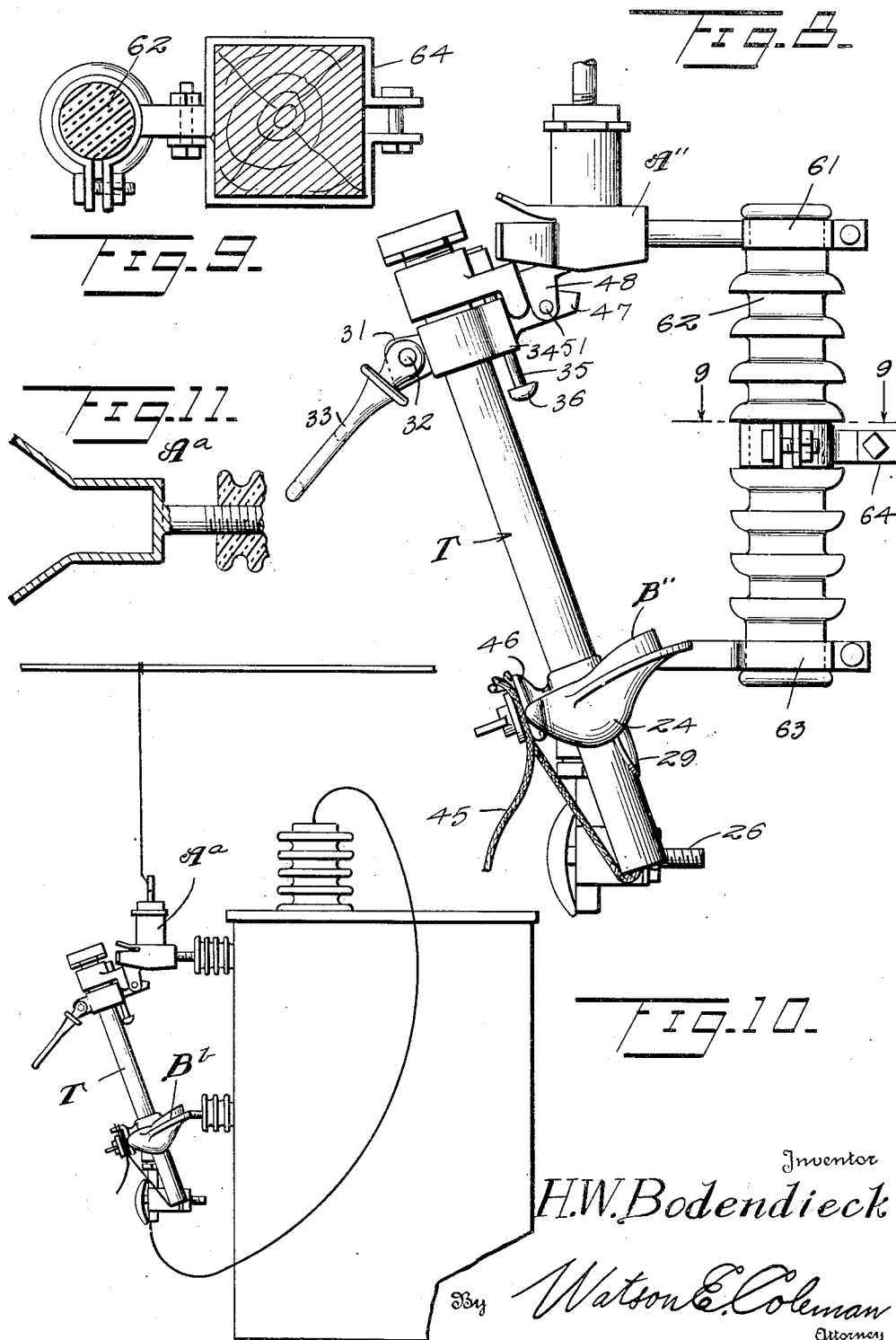
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FUSE DEVICE

Filed May 8, 1937

4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,212,632

FUSE DEVICE

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Application May 8, 1937, Serial No. 141,502

3 Claims. (Cl. 200—116)

This invention relates to fuse devices and has relation more particularly to a device of this kind especially designed and adapted for use in connection with high tension lines although I do not wish to be understood as limiting myself to such use as, of course, the invention as herein disclosed can be employed to advantage in connection with telephone, telegraph and other low tension lines should it be so desired.

The invention has for an object to provide a device of this kind including a fuse tube together with means whereby the fuse tube may be readily removed after a blow-out of the fuse and wherein the mounting for the tube is such to permit the tube to move into an open position after a blow-out sufficiently to eliminate possibility of arcing after such blow-out and also to allow the tube when in its blown position to serve as a tell-tale to indicate where a fuse replacement is required.

The invention also has for an object to provide a fuse device including a fuse tube provided with suitably spaced contact members electrically connected by a fuse disposed through the fuse tube together with a mounting for said fuse tube operating to permit release of the gases generated within the tube at the time of blow-out with means to absorb the kick imparted to the tube at the time of blow-out whereby the life of the device is prolonged.

A still further object of the invention is to provide a device of this kind including a fuse tube together with a mounting for such fuse tube including coacting fittings having associated rounded surfaces coacting to provide a fulcrum to facilitate the application of a fuse tube and with equal facility to allow the tube after the fuse is blown to swing or drop into open position.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved fuse device whereby certain important advantages are attained and the device rendered simpler, less expensive and otherwise more convenient and advantageous for use, as will be hereinafter more fully set forth.

The novel features of my invention will hereinafter be definitely claimed.

In order that my invention may be the better understood, I will now proceed to describe the same with reference to the accompanying drawings, wherein:

Figure 1 is a view partly in side elevation and partly in section of a fuse device of a line tapping

type, a line or conductor with which the device is engaged being shown in section;

Figure 2 is a view in front elevation of the structure as illustrated in Figure 1 with the line or conductor indicated by broken lines;

Figure 3 is a view partly in elevation and partly in section showing the fuse tube just before it reaches its fully open blown position ready to be removed for re-fusing;

Figure 3^a is a sectional view taken substantially on the line 3^a—3^a of Figure 3 looking in the direction of the arrows;

Figure 3^b is a detail sectional view taken substantially on the line 3^b—3^b of Figure 3;

Figure 4 is a fragmentary detail sectional view taken substantially on the line 4—4 of Figure 1;

Figure 5 is a fragmentary detail sectional view taken substantially on the line 5—5 of Figure 3;

Figure 6 is a view partly in section and partly in elevation illustrating features of a fuse device constructed in accordance with another embodiment of my invention;

Figure 7 is a fragmentary detail sectional view taken substantially on the line 7—7 of Figure 6;

Figure 8 is a view in side elevation illustrating a fuse device constructed in accordance with a still further embodiment of my invention;

Figure 9 is a sectional view taken substantially on the line 9—9 of Figure 8 with an associated support to which the insulator is attached in section;

Figure 10 is a view in side elevation and of a somewhat diagrammatic character illustrating a fuse device assembled for use in connection with a transformer;

Figure 11 is an enlarged fragmentary sectional view illustrating a means for mounting a fitting as comprised in Figure 10;

Figure 12 is a detail sectional view taken substantially on the line 12—12 of Figure 1.

The embodiment of the invention as illustrated in Figures 1 to 5 inclusive is of a tapping type and comprises two fittings A and B. The fitting A embodies a member or body 1 having a bore 2 extending a major length therethrough, said bore being closed at the upper or outer end of the member or body 1 and open at its lower end. The bore 2 adjacent to its inner or lower end is restricted, as at 3, to provide an internal seat to limit the extent of movement of the ball 4 beyond said open end of the bore 2 under the action of the spring 5. This spring 5 as herein disclosed is of a coil type and of required tension and is interposed between the applied ball 4 and the upper or outer closed end of the bore 55

2. The spring 5 in initial assembly may be readily inserted within the bore 2 through its inner or lower open end but the ball 4 is placed within the bore 2 through a suitable opening 6 in the rear wall of said bore 2 as is particularly illustrated in Figure 3. This opening 6 is preferably normally closed by a spring cap 7 so as to prevent ingress of dirt or other foreign matter within bore 2 to interfere with the desired ready and free action of the ball 4 under control of the spring 5.

The lower or inner end of the body or member 1 at opposite sides of the open end of the bore 2 has formed therewith parallel flanges 8 having their rear extremities continued by the outwardly flared or diverging guide arms 9. The lower or inner end of the body 1 at its rear is also provided with the upwardly inclined guide plate 10 which is positioned between the arms 9.

The body or member 1 constitutes a fixed jaw and has disposed transversely across its front face a conductor or line receiving groove 11. Pivotally engaged, as at 12, with the member or body 1 outwardly or above the groove 11 is a swinging jaw 14 for coaction with the member or body 1 for effective clamping action upon a conductor or line L under the action of the screw member 15. This screw member 15 threads through an outstanding boss 16 carried by the body or member 1 for contact with the tail extension 17 of the swinging jaw 14. The outer end of the screw member 15 carries an enlarged eye member or head 18 to be engaged by a suitable tool for operating the screw member 15 to either tighten the jaw 14 with respect to its work or vice versa. This screw member 15 is also intended to be engaged with a suitable stick or implement to apply the clamp to the conductor or line L or to remove the device.

The body or member 1 together with its flanges 8 and the jaw 14 are conductors of electricity. Interposed between the front end portions of the flanges 8 and integrally formed therewith and with the lower or inner end of the body or member 1 is a stop flange 19 for a purpose to be hereinafter more particularly referred to.

In this embodiment of my invention, the flanges 8 closely adjacent to their junctions with the arms 9 have integrally formed therewith the downwardly or inwardly facing socket members 20 in which are securely anchored the extremities of the substantially parallel insulator bars 21 of desired length. The lower or opposite end portions of these bars 21 are securely fastened within the sleeves 22 and 22' arranged at opposite sides of the fitting B and integral therewith.

The fitting B is of substantially a U-shape in cross section with the sleeves 22 and 22' adjacent to the outer or free extremities of said fitting B. This fitting B is constructed and formed to have its rear or intermediate portion 23 above the extremities of the fitting and the side arms 24 adjacent to their free ends and particularly between the sleeves 22 and 22' are relatively broad with the opposed faces of the side arms provided with the concaves 25 formed about a common center for a purpose to be hereinafter more particularly referred to.

One of the sleeves, as 22', carries a terminal contact 26 of any preferred type and which, of course, is in proper electrical connection with the fitting B which is of a material readily conductive of electricity.

The fuse tube T is made of the customary insulating material, the same being open at both ends. At a point adjacent its lower end the tube T has snugly fitted thereon a contact member 27 having a lower or outer convex portion 28 parti-spherical in form and of a radius substantially the same as the radius of the concave portions 25 of the fitting B so that when the member 27 is engaged with the fitting B the same will have free rolling movement in all directions particularly to facilitate dropping of the fuse tube T when blown and, of course, to facilitate the replacement of the fuse cartridge. The contact member 27 is so spaced from the lower end of the tube T to permit said lower end portion of the tube T as the major portion of the tube drops, to swing up between the side arms of the fitting B and contact with the raised intermediate or connecting portion 23 of the fitting whereby the extent of dropping movement of the tube T is limited. The contact member 27 is preferably provided with an integral extension 29 disposed downwardly along the tube T for direct contact with the fitting B whereby the tube T is protected against injury.

The upper or outer end portion of the tube T has securely mounted thereon a collar 30 provided at its front portion with an outstanding lug 31 to which is pivotally connected, as at 32, an eye member 33. This eye member 33 swings freely in a direction lengthwise of the tube T but the movement of the member 33 towards the tube T is limited by contact of the member 33 with an outer corner of the lug 31 as particularly illustrated in Figure 1 of the drawings. This eye member 33 provides means whereby the tube T may be readily removed from the fitting B when the tube is in blown position or a re-fuse tube can be placed in operative engagement with both fittings A and B. This tube can be readily removed through the use of a well known type of hot stick or other implement which can be employed for manually operating the tube.

The rear portion of the sleeve 30 is provided thereacross with an outstanding boss 34 through which is slidably disposed an elongated rod 35. One end portion of this rod 35 carries a head 36 but contacts from below with the boss 34 to limit the upward or outward lengthwise movement of the rod 35 through the boss 34. The outer end portion of the rod 35 is rigidly secured to a laterally extending plate 37 carried by a cap member M. This member M comprises a sleeve 38, the inner end portion of which freely receives the adjacent upper or outer end of the tube T when the member M is at the limit of its movement toward the tube T. This sleeve 38 intermediate its ends is intersected by a plate 39 integral therewith and the sleeve 38 below the plate 39 is provided with a recessed portion 40 into which extends the upper end of the tube T when in closed position.

Disposed through the center of the plate 39 is a relatively large opening 41 through which is adapted to be inserted from without a conventional type of fuse 42. This fuse 42 carries a button 43 of a diameter in excess of the diameter of the opening 41 so that effective attachment may be had of the fuse with the member M. It is preferred, however, that the fuse 42 be also inserted through a washer 44 which is interposed between the button 43 and the plate 39. The fuse 42 has associated therewith a conventional flexible pigtail 45 which is disposed through the tube T and passes out through the inner or lower end thereof and is extended up-

wardly and suitably clamped, as at 46, to the contact member 27. When the fuse 42 is properly applied the pigtail 45 serves to hold the member M in closed position upon the adjacent end of the tube T.

Extending outwardly from the boss 34 is an arm 47 which extends between a pair of lugs 48 depending from the inner end portion of an upwardly inclined shank 49, the free end portion of which terminates in a depending angular head 50. The lugs 48 are pivotally connected, as at 51, to the arm 47 and the shank 49 is provided at its inner or pivoted extremity with the bifurcated tail piece 52 which straddles the rod 35.

When the cap member M is in closed position the plate 37 contacts the tail piece 52 and holds the same in close contact with the adjacent outer end of the boss 34, and at the same time holding the shank 49 rigid so that as the tube T is swung up toward the fitting A the head 50 will readily pass the ball 4 whereby the tube T is maintained in its desired raised and effective position. This shank 49 as well as the member M and its parts are also of material conductive of electricity so that when the device is engaged with the line or conductor and the fuse functioning the flow will be through the fitting A, the shank 49 to the cap member M and along the fuse 42 and pigtail 45 to the contact member 27 to which the pigtail is clamped at 46.

It will be noted at this time that it is the mounting or placement of the fuse 42 that maintains the tube T in its raised or effective working position as the substantial rigidity of the shank 49 is dependent upon the holding contact of the member M upon the tail piece 52 of said shank 49.

It is also to be noted that the shank 49 is of a length to prevent the tube T from passing the vertical and that it is disposed in a direction to cause the force of impact imposed upon the shank 49 as it passes the ball 4 to be transmitted direct to the arm 47 thus minimizing or substantially eliminating breakage of the fuse 42 at the time the tube T is locked in its raised or effective working position. In other words, when the tube T is forced into its closed position to complete a circuit, liability is substantially eliminated of imposing upon the fuse 42 any extremely heavy strain which would in many cases either rupture or completely dismember the fuse 42.

Immediately upon the blowing of the fuse 42 there is a certain amount of re-coil of the tube T resulting from the force of the attendant explosion but this re-coil is effectively absorbed by the spring 5 through the ball 4 and at the same time the cap member M is thrown into raised or lifted position. This results in both ends of the tube T being opened permitting ready escape of the gases created at the time of the blow out and thus materially silencing the sound of the blow out.

As the cap member M is raised or lifted the shank 49 is also released so that said shank 49 will offer no hindrance or obstruction to the dropping or swinging down of the tube T to its fully blown position which it has almost reached in Figure 3. With the tube T in its blown position it will readily serve as a telltale as to the necessity of re-fusing. When the shank 49 passes the ball 4 the resilient contact has a tendency to partially rotate the ball thus forming a new contact or face on the ball 4 each time the fuse tube T is forced into circuit closing position.

It is also to be particularly emphasized that after the head 50 of the shank 49 passes the ball 4 it will have close contact with the flange 19 or the adjacent portion of the member 1. This contact eliminates to a great extent current travel through the ball 4 and the spring 5 or, in other words, the ball 4 and spring 5 are shunted out through the shank 49 due to the contact of the head 50 with the flange 19 or the adjacent portion of the member 1.

Relative to the parti-spherical portion 28 of the member 27 it is to be particularly stated that its co-action with the concave portions 25 of the fitting B gives to the tube T the feature of being self-aligning which, in an apparatus of this kind, is of particular value and importance.

In the embodiment of my invention as illustrated in Figures 6 and 7, the body or member 1' of the fitting A' has extending laterally therefrom an arm 53 also rigidly secured to a cap 54 rigidly fitted upon the upper end portion of an elongated insulator 55. This cap 54 is also provided with suitable means, as at 56, whereby the insulator 55 may be suspended from a cross arm or otherwise as preferred. The body or member 1' of the fitting A' also carries a suitable terminal connector 57 which in its detail forms no part of my invention. The fitting B' has a lateral arm 58 which is secured to a cap 59 securely engaged with the lower end of the insulator 55 and this cap 59 carries a terminal connector 60 of any preferred type. Coacting with these fittings A' and B' in the same manner as hereinbefore described with respect to the fittings A and B is a tube T and its concomitant parts as previously described.

In Figures 8 and 9 is illustrated an embodiment of the invention wherein the fitting A'' is clamped, at 61, to the upper end of an insulator 62 while the fitting B'' is clamped, as at 63, to the lower end portion of such insulator 62. The central portion of the insulator 62 is clamped, as at 64, to a vertical post or the like or by having the clamp at right angles to what is shown in Figure 9 the insulator 62 can be readily secured to a cross arm. These fittings A'' and B'' also have coacting therewith the tube T and its parts in the same manner as has hereinbefore been described in connection with the first embodiment of the invention.

In Figure 10 is illustrated an assembly wherein the fittings A^a and B^b are suitably attached to the wall of a transformer and with which fittings coacts as has hereinbefore been described the tube T and its parts.

From the foregoing description it is thought to be obvious that a fuse device constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice except as hereinafter claimed.

I claim:

1. A fuse device comprising two spaced fittings, each being of a material conductive of electricity and having means for connection with a conductor, said fittings when in applied position being one above the other, the lower fitting being

substantially in the form of an inverted U and having side arms provided with concavities in opposed faces, a fuse tube, a contact member secured to one end portion of the tube and disposed therearound, said contact member having a parti-spherical portion engaging within the concavities of the arms of the lower fitting to allow for swinging movement of the tube, a conductor member carried by the opposite end portion of the tube, means carried by said conductor member for detachable engagement with the upper fitting, a fuse normally providing an electrical connection between the conductor member and the contact member, said conductor member releasing from the upper fitting upon blowing of the fuse to allow the tube to swing downwardly.

2. A fuse device comprising two spaced fittings, each being of a material conductive of electricity and having means for connection with a conductor, said fittings when in applied position being one above the other, the lower fitting having side arms provided with concavities in opposed faces, a fuse tube, a contact member secured to one end portion of the tube and disposed therearound, said contact member having a parti-spherical portion engaging within the concavities of the arms of the lower fitting to allow for swinging movement of the tube, a conductor member carried by the opposite end portion of the tube, means carried by said conductor member for detachable engagement with the upper fitting, a fuse normally providing an electrical connection between the conductor member and the contact member, said conductor member releasing from the upper fitting upon blowing of the fuse to allow the tube to swing downwardly.

3. A fuse device comprising two fittings to be positioned one above the other, a fuse tube supported by the lower fitting for swinging movement toward or from the upper fitting, a shank pivotally engaged with the upper portion of the tube when in its raised position, said upper fitting having a bore open at its lower end, a ball member within the bore, the lower end of the bore being restricted to provide an internal seat to limit the extent of movement of the ball member beyond said lower open end of the bore, yieldable means for constantly urging the ball member to its seat, said ball member engaging the shank when the tube is in its raised position and the shank held against swinging movement for maintaining the shank in its raised position, and means carried by the tube including a fuse for holding the shank against swinging movement, said means releasing the shank upon blowing of the fuse to permit the tube to swing downwardly.

4. A fuse device comprising an insulating support, and a pair of metal fittings carried by said support in spaced relation to each other for supporting a fuse tube, one of said fittings having a detent for engaging a part on said fuse tube and the other of said fittings having a pair of laterally projecting legs separated at their free ends to pass said tube, said legs being formed at the top inside with partially spherical formations for

engaging and retaining a complementary formation on said tube.

5. A fuse device comprising an insulating support, and a pair of metal fittings carried by said support in spaced relation to each other for supporting a fuse tube, one of said fittings having a detent for engaging a part on said fuse tube and the other of said fittings having a pair of laterally projecting legs separated at their free ends to pass said tube, said legs being formed at the top inside with partially spherical formations for engaging and retaining a complementary formation on said tube, and said legs being elongated to provide clearance between said yoke and tube when the fuse tube is supported by said detent, and said tube engaging said yoke for support of said tube when said tube is released from said detent.

6. A fuse tube unit comprising an insulating tube, a metallic fitting at one end of said tube having a movable part for engaging a detent on a support, a fuse link in the tube and tensioned to hold said movable part in engagement with said detent, and a metallic fitting carried adjacent to but spaced inwardly of the other end of said tube, and adapted to be connected to the other end of said fuse link, said latter fitting having a partially spherical surface on its lower outside part for engaging in a complementary socket.

7. A fuse tube unit comprising an insulating tube, a metallic fitting at one end of said tube having a movable part for engaging a detent on a support, a fuse link in the tube and tensioned to hold said movable part in engagement with said detent, and a metallic fitting carried adjacent to but spaced inwardly of the other end of said tube, and adapted to be connected to the other end of said fuse link, said latter fitting having a partially spherical surface on its lower outside part for engaging in a complementary socket, and having a depending stop flange for engaging a support and holding the tube in inclined position.

8. A fuse device comprising an insulating support, and a pair of metal fittings carried by said support in spaced relation to each other for supporting a fuse tube, one of said fittings having a detent for engaging a part on said fuse tube and the other of said fittings having a pair of laterally projecting legs separated at their free ends to pass said tube, said legs being formed at the top inside, with partially spherical formations for engaging and retaining a complementary formation on said tube, a fuse tube unit comprising an insulating tube, a metallic fitting at one end of said tube having a movable part for engaging a detent on a support, a fuse link in the tube and tensioned to hold said movable part in engagement with said detent, and a metallic fitting carried adjacent to but spaced inwardly of the other end of said tube, and adapted to be connected to the other end of said fuse link, said latter fitting having a partially spherical surface on its lower outside part for engaging in a complementary socket.

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