Oct. 10, 1939. L. KELLNER 2,175,436

RENEWABLE FUSE

Filed July 16, 1937

Fig. 1.

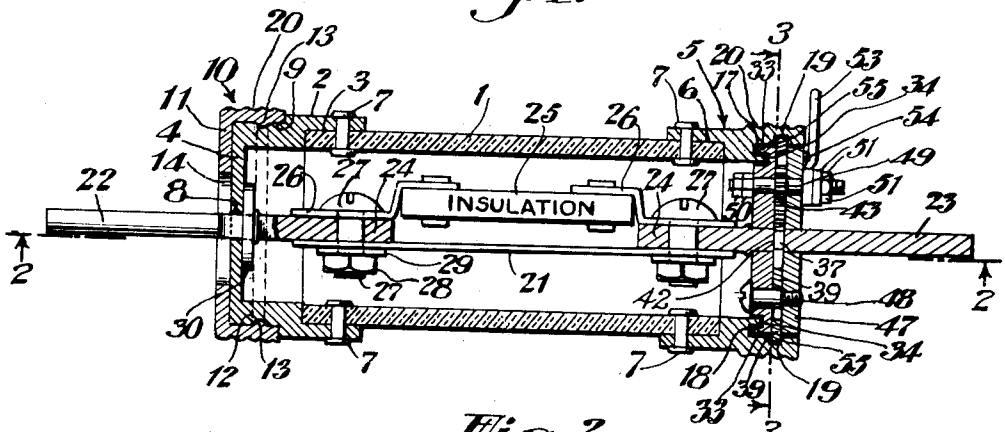


Fig. 2.

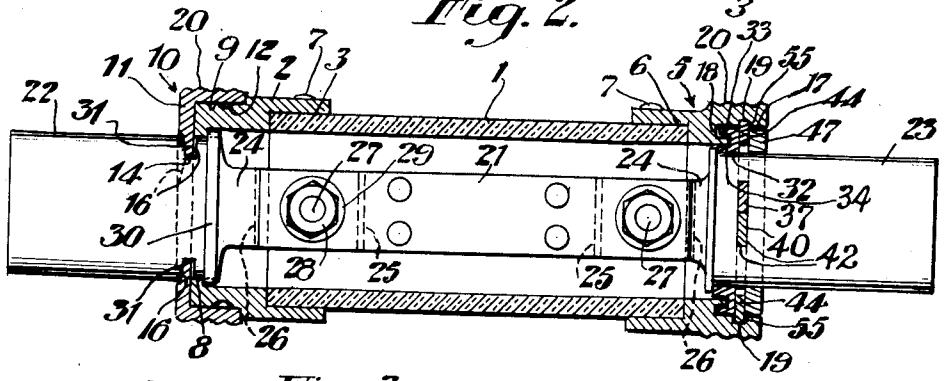


Fig. 3.

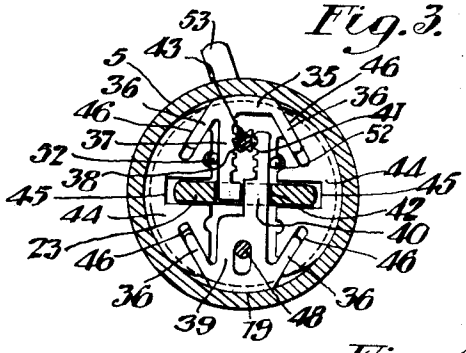


Fig. 5.

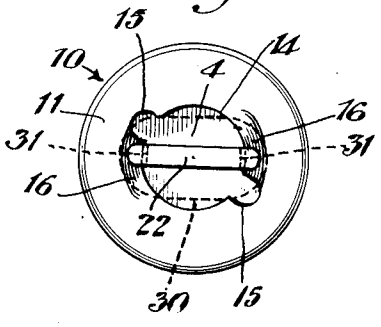
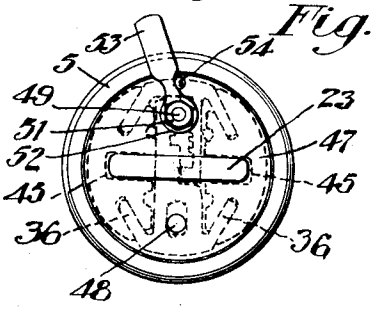


Fig. 4.



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2,175,436

RENEWABLE FUSE

Louis Kellner, Brooklyn, N. Y.

Application July 16, 1937, Serial No. 154,000

18 Claims. (Cl. 200—131)

This invention relates more particularly to improvements in an electric fuse structure of the cartridge type wherein a fuse element is enclosed within a tubular casing and has terminal blades projecting from the opposite ends of the casing.

Important objects of the invention are, to facilitate renewal of the fuse; to provide for more secure locking of the fuse parts to the casing; to provide for convenient unlocking of such parts from the casing; and to provide for effective sealing of the casing against escape of fire and at the same time permit escape of gas when the fuse blows, in order to prevent bursting of the casing.

Other objects of the invention will appear hereinafter.

In the drawing, Fig. 1 is a longitudinal sectional view of the improved fuse structure;

Fig. 2 is a longitudinal section on the line 2—2 of Fig. 1;

Fig. 3 is a cross section on the line 3—3 of Fig. 1;

Fig. 4 is a view of one end of the fuse structure;

Fig. 5 is a view of the opposite end of the fuse structure.

Heretofore the construction of a satisfactory renewable fuse of the present type has been a difficult problem. Fuses are required to pass underwriter's inspection and tests. These tests are quite severe. In performing them cotton is packed around the fuse assembly and then the fuse is blown. The structure is subjected to quite a number of such tests and if, in any one of the tests, the cotton becomes ignited the fuse structure is condemned. Among the causes of failure of removable fuses to pass the tests are, insecure locking of the fuse parts at the ends of the casing which permits said parts to blow out of place under the pressure of the fuse blow-out, imperfect sealing at the ends of the casing against escape of sparks or flame, and insufficient venting of the casing to prevent its bursting. Other faults in such fuses are difficult installation of the fuse in the casing and failure of the locking means for the fuse terminals to function properly after a fuse blow-out, owing to the heat and the pressure strain to which the locks are subjected. My invention is directed to the correction of all of these faults in a renewable fuse.

The fuse structure includes a tubular casing comprising a cylindrical body 1 of stout, stiff insulation. A metal cap 2 is fitted over one end of the body 1. Said cap is counterbored, as at 3, to receive the body 1 and afford an end abutment for it. The cap forms an end wall 4 for the casing. At the opposite end of the casing body there is a metal collar or ferrule 5 counterbored, as at 6, to receive said end and form an abutment for it. The cap and collar closely fit the ends of the casing body and are rigidly and permanently secured thereto by rivets 7.

The casing end wall 4 has an elongated aperture or slot 8 through which one of the fuse terminal blades projects. The outer end portion of the cap 2 is reduced in diameter and forms a seat or journal 9 for another cap 10 constituting a locking member rotatably fitted upon the seat 9 and having an end wall 11 abutting the casing end wall 4. An annular groove 12 is formed in the seat 9 and projections 13 on the cap 10 protrude into said groove to hold the cap in place. The cap wall 11 has a central aperture 14 of less diameter than the length of the slot 8 and also has notches 15 diametrically arranged and opening into the aperture 14. The distance between the bottoms of these notches across the aperture is approximately equal to the length of the slot 8. At the margin of aperture 14 the cap wall 11 has two diametrically arranged, arcuate cam surfaces 16 sloping inward from the outer face of said wall to the notches 15. These cams function to lock one of the fuse terminals to the casing and also seal the slot 8, as will be explained hereinafter. At the opposite end of the casing the collar 5 is counterbored from its outer end, as at 17. In the bottom of this counterbore there is an annular groove 18 and in the side of the counterbore there is an annular groove 19. Groove 18 has a baffling function and groove 19 has a locking function, as will be explained hereinafter. The periphery of the fixed cap 5 and the periphery of the rotatable cap 10 are both knurled, as at 20. All of the structure so far described comprises a permanently assembled casing unit.

A fuse unit extends through the casing and is detachably secured thereto. The fuse unit includes a fuse strip 21 and terminal blades 22 and 23 joined to the ends of said strip. The terminals have reduced inner end portions or shanks 24 to one face of which the strip 21 is detachably secured. A rigid connection also joins the terminals to hold them together in properly spaced relation after the fuse strip has been blown. This rigid connection comprises a rigid bar 25 of insulation, and stiff metal clips 26 riveted to the opposite ends of said bar. The clips extend endwise from the bar and bear against the opposite face of the terminal shanks from the fuse strip. Bolts 27, nuts 28 and washers 29 secure the fuse strip and the clips to the terminal shanks.

Terminal blade 22 projects outward through the slot 8 in the casing end wall 4 and bears a surrounding metal abutment flange 30 to bear against the inner face of said wall to seal the slot 8. The flange is in the present instance formed of an elongated metal disk apertured to receive the terminal blade and the blade and disk have a close, swaged fit rendering them in effect permanently integral and rigid and preventing escape of gas through the aperture in the disk. Outwardly of the flange 30 the opposite edges of the terminal blade have notches 31 disposed to permit entry of the low ends of the cams 16 borne by the rotatable locking cap 10. Thereby the flange may be drawn tight against the wall 4 by locking rotation of the cap.

A metal closure disk 32 for the opposite end of the casing is affixed to the terminal 23. This disk also, in the present instance, is secured to the terminal in the same manner as the flange disk 30 so that it surrounds the terminal blade 23, forms in effect a permanent, rigid, integral part thereof and forms a gas-tight seal between the terminal and disk. At its outer edge the disk is formed with an annular baffle flange 33 and a groove 34 at the inner side of said flange. The flange is disposed to enter the annular groove 18 in the collar 5 and the groove 34 is disposed to receive the annular flange forming the inner wall of the groove 18, for a desired baffling effect. The periphery of disk 32 has an easy working fit in the counter-bore 17.

A locking mechanism is mounted upon the outer face of the disk 32 to lock the fuse unit to the adjacent end of the casing. The mechanism includes a number of flat locking elements or bolts and manually operable means to shift them in unison into and out of the groove 19. In the present instance there are four of the locking elements and their locking portions are of segmental form, having arcuate outer edges whose curvature corresponds approximately to that of the bottom of the groove 19. The elements surround the terminal blade 23. One of the elements, designated 35, has inwardly diverging prongs 36 at opposite ends of its locking portion and a short inwardly extending shank 37 between said prongs and formed with rack teeth 38 at one edge. Another element 39, diametrically disposed with reference to element 35 has similar prongs 36 similarly disposed and diverging toward the prongs of element 35. Element 39 has a longer shank 40 with rack teeth 41 in spaced opposition to rack teeth 38. The shanks 37 and 40 have portions of reduced width slidably received in an aperture 42 in the terminal blades 23. A pinion 43 rotatably mounted on the disk 32 meshes with the teeth of both racks. Between the locking elements 35 and 39 are two diametrically disposed locking elements 44 of the same shape. They have clearance notches or slots 45 to receive the opposite edges of the terminal blade. They also have oblique slots 46 formed and arranged to slidably receive the two pairs of prongs 36.

The four locking elements may be made inexpensively of sheet metal stampings. They are operatively held in the same plane upon the disk 32 and covered by an outer disk 47. The latter is held in place by a screw 48 and by the shaft 49 of the pinion 43. The screw is passed outwardly through the disk 32 and screwed into the disk 47 and is shouldered to hold the disks properly spaced. The pinion shaft extends through bearing apertures in both disks and is threaded at its ends to receive nuts 50 and 51. There may also be pins 52 borne by one or both disks at opposite sides of the pinion to hold the racks to the pinion. At the outer face of the disk 47 there is an operating handle 53 for the pinion. Said handle has an eye fitted over the pinion shaft and keyed to it. A washer is disposed between the nut 51 and said eye. For convenience in operating it the handle extends beyond the periphery of the collar 5. On the outer face of the disk 47 there is a locking bump 54 over which the handle snaps to yieldably hold the handle in a locking position and in an unlocking position.

The pinion 43 is fixed to rotate with its shaft so that when the handle is swung in one direction the locking elements 35 and 39 will be projected in unison into the annular groove 19 of the casing collar. The angularity of the prongs 36 on said locking elements and of the slots 46 on the other locking elements is such that when the elements 35 and 39 are shifted outward the other locking elements will be cammed outward in unison therewith and into the groove 19. When the handle is rocked in the opposite direction all of locking elements will be retracted in unison from groove 19 to positions beneath the cover disk 47. The outer side of the groove 19 forms a keeper abutment 55 disposed in a plane at a right angle to the axis of the fuse casing, and the locking elements are also in a plane at a right angle to said axis so that the keeper abutment and the locking elements mutually engage in a manner for positive locking. The locking margins of the segmental locking elements also make an almost complete circle for maximum contact around the keeper abutment.

The four locking elements arranged for radial movement form an expansible locking means which serves to center the fuse unit within the casing and also the cooperating fire-baffling ribs and grooves of the casing and the closure disk. The four locking elements fitting within the groove 19 rotatively lock the closure disk and the terminal carrying said disk to the casing so that the terminal 23 carrying the closure disk may be rotated slightly in either direction in order to aline it properly with the contact clip which is to receive it. The flexibility of the connection between the inner ends of the two terminals will permit a slight rotation of the terminal 23 with respect to the terminal 22, so that if the clips to receive these terminals are not quite accurately lined up with respect to each other, terminal 23 may be rotated slightly in order to bring it into alinement with its contact clip.

The fuse strip 1, the terminals 22 and 23, the rigid insulation connection therebetween, the sealing flange 30, the disks 32 and 47, and the expansible locking mechanism are all held together as parts of the fuse unit. The fuse unit is installed in the casing by entering the terminal blade 22 through the open end of the casing defined by the collar 5, and through the slot 8 in the opposite end wall 4 and the notches 15, which are first placed in register with slot 8 by rotation of the locking cap 10. When the flange 30 has bottomed on the end wall 4 the locking cap is rotated to bring its cam 16 into engagement with the outer sides of the notches 31 of the terminal blade and cam the blade outward. This draws the flange 30 tightly against the wall 4 to seal the slot 8. The sealing flange 30, the baffle flange 33 and the expansible locking mechanism borne by the disk 32 are so spaced along the fuse unit that when the flange 30 seats on the end wall 4

the baffle flange 33 at the opposite end of the casing will be properly disposed in the groove 18, and the locking segments will be in register with the keeper groove 19. Then the handle 53 is operated to expand the locking segments into the keeper groove.

The fuse unit is securely locked to both ends of the casing in the manner described, and escape of fire from the casing is effectually prevented. One end of the casing is sealed by the flange 30. At the other end escape of fire is effectually prevented by the baffle means including the flange 33 and the grooves 18 and 34. At the same time, gas under the force of the fuse blow-out will be forced past the baffle means and past the disk 32, the locking segments and the disk 47 to relieve the pressure and prevent rupture of the casing. After a blow-out the fuse unit can be readily withdrawn after operating the handle 53 to retract the locking segments and rotating the locking cap 10 to release position. Owing to the provision of a rigid connection between the fuse terminals independent of the fuse strip the terminals are held in a definite spaced relation even after the fuse blows so that the terminals can be withdrawn together and a new fuse strip can be readily attached to the spaced terminals. The locking mechanism is also of such character as to withstand numerous blow-outs.

What I claim is:

1. An electric fuse structure including a tubular casing open at one end and having an apertured end wall at its other end; a fuse unit extending through said casing and insertible and removable through the open end of the casing and comprising a fuse strip, terminal members joined to the opposite ends of said strip and projecting from the opposite ends of said casing and one of which terminal members projects through said aperture in the casing end wall, a sealing abutment fixed to the latter terminal member to abut the inner face of said end wall to prevent escape of fire through said aperture, a closure disk for the opposite open end of the casing fixed to the other terminal member and adapted to fit within the said casing and to be removed therefrom with the fuse unit, and radially expansible locking means carried by the closure disk and cooperable with the inner surface of the casing to lock said closure disk within the casing, and disposed to register for locking cooperation when said sealing abutment at the opposite end of the unit contacts said end wall.

2. An electric fuse structure including a tubular casing having an end wall with an aperture; a fuse unit extending through said casing and insertible and removable through the opposite end of the casing and comprising a fuse strip, terminal members joined to the opposite ends of said strip and projecting from the opposite ends of said casing and one of which terminal members projects through said aperture in the casing end wall, a sealing abutment borne by the latter terminal member to abut the inner face of said end wall to prevent escape of fire through said aperture, a closure disk for the opposite end of the casing fixed to the other terminal member, and expansible locking and centering means borne by the latter terminal member and adapted to engage the casing to lock said closure disk to the casing and center the fuse unit therein, and disposed to register for locking cooperation with the casing when said sealing abutment contacts said end wall.

3. An electric fuse structure including a tubular casing having an end wall with an aperture; a fuse unit extending through said casing and insertible and removable through the opposite end of the casing and comprising a fuse strip, terminal members joined to the opposite ends of said strip and projecting from the opposite ends of said casing and one of which terminal members projects through said aperture in the casing end wall, a sealing abutment borne by the latter terminal member to abut the inner face of said end wall to prevent escape of fire through said aperture, a closure disk for the opposite end of the casing fixed to the other terminal member and expansible locking and centering means borne by the latter terminal member and adapted to engage the casing to lock said closure disk to the casing and center the fuse unit therein, and disposed to register for locking cooperation with the casing when said sealing abutment contacts said end wall, and means carried by the closure disk for operating the said expansible locking means to locked and unlocked positions.

4. An electric fuse structure including a tubular casing having an end wall with an aperture; a fuse unit extending through said casing and insertible and removable through the opposite end of the casing and comprising a fuse strip, terminal members joined to the opposite ends of said strip and projecting from the opposite ends of said casing and one of which terminal members projects through said aperture in the casing end wall, a closure disk for the opposite end of the casing fixed to the other terminal member, and expansible locking and centering means borne by the latter terminal member and adapted to engage the casing to lock said closure disk to the casing and center the fuse unit therein, and means carried by the closure disk for operating the said expansible locking means to locked and unlocked positions.

5. An electric fuse structure comprising a tubular casing having an end wall with an elongated aperture; a fuse unit extending through said casing and comprising a fuse strip, terminal blades joined to the opposite ends of said fuse strip one of said blades projecting outward through said aperture and the other projecting outward from the opposite end of the casing, a rigid bar of insulation also joining said blades to hold them together as a unit when the fuse is blown, a sealing disk borne by and surrounding the terminal blade at said opposite end of the casing and having an annular baffle flange with its edge directed inwardly of the casing, the casing having an outwardly opening annular internal groove into which said flange extends to baffle escape of fire, and a sealing flange borne by and surrounding the other terminal blade to abut the inner face of said casing end wall to prevent escape of fire through said aperture; locking means borne by the casing and operable to force and hold said sealing flange in sealing position; a plurality of locking segments borne by the fuse unit at the outer face of said sealing disk to shift radially of the casing axis, the casing having an annular inwardly facing keeper abutment outward of its said baffle groove and disposed to receive said segments when said sealing flange abuts said wall at the opposite end of the casing, and lock-operating means borne by the fuse unit to shift said segments in unison radially of the casing to lockably engage said keeper abutment, the fuse unit being withdrawable from the casing away from said end wall upon release of said locking means at opposite ends of the casing.

6. A fuse structure comprising a tubular casing, a fuse element within said casing and having a terminal member projecting from one end of the casing, a closure disk for said end of the casing borne by and surrounding said terminal member and having an annular flange directed inwardly longitudinally of the casing, the casing having an internal groove to receive said flange, to baffle escape of fire from the casing, and means to releasably lock said disk to the casing.

7. A fuse structure comprising a tubular casing, a fuse element within said casing and having a terminal member projecting from one end of the casing, a closure disk for said end of the casing borne by said terminal member; and locking means to secure said disk releasable to the casing comprising a keeper abutment borne by the casing and facing inwardly longitudinally of the casing, a plurality of locking members mounted on the outer face of said disk to shift radially of the disk, and manually operable means borne by the disk to shift said locking members radially in unison into and out of locking relation to said keeper abutment.

8. A fuse structure comprising a tubular casing, a fuse element within said casing and having a terminal member projecting from one end of the casing, a closure disk for said end of the casing borne by said terminal member; and locking means to secure said disk releasably to the casing comprising a keeper abutment borne by the casing and facing longitudinally inward thereof, a manually rotatable pinion borne by said disk, a plurality of segmental locking elements mounted on the outer face of said disk to shift radially of the disk and including a pair of diametrically arranged elements with rack teeth engaged by said pinion, to shift the pair in unison into and out of locking relation to said keeper abutment, and others of said locking elements between said pair and having interlocking connections therewith to shift with said pair in unison into and out of locking relation to the keeper abutment.

9. An electric fuse structure comprising a tubular casing having an end wall with an elongated aperture, a fuse element within the casing having a terminal blade projecting outward through said aperture, a sealing flange borne by and surrounding said terminal blade to abut the inner face of said end wall around the margin of said aperture to prevent escape of fire through the aperture, a rotatable locking cap secured permanently to the end of the casing for rotation about the axis of the casing and having an apertured end wall to receive the projecting terminal blade and having diametrically arranged locking cams formed on the exterior surface of said end wall at the margin of said aperture therein, and abutments borne by said terminal blade at opposite side edges thereof and engageable by said cams to force and hold said sealing flange against said end wall upon rotation of the locking cap in one direction.

10. A fuse structure comprising a tubular casing, a fuse element within said casing and having a terminal member projecting from one end of the casing, and a closure disk for said end of the casing borne by and surrounding said terminal member and having an annular flange directed inwardly longitudinally of the casing, the casing having an internal groove to receive said flange, to baffle escape of fire from the casing.

11. An electric fuse structure comprising a tubular casing having an end wall with an elongated aperture, the other end of said casing being open; a fuse unit extending through said casing and comprising a fuse strip, terminal blades joined to the opposite ends of said fuse strip one of said blades projecting outward from the opposite open end of the casing, a rigid bar of insulation also joining said blades to hold them together as a unit when the fuse is blown, a sealing flange borne by and surrounding one terminal blade to abut the inner face of said casing end wall to prevent escape of fire through said aperture; rotary cam locking means permanently connected to the casing and adapted to engage that portion of the terminal extending through said aperture and operable to force and hold said sealing flange in sealing position against said end wall; a sealing disk fixed to and surrounding the terminal blade at said open end of the casing and adapted to close said open end, a plurality of locking segments borne by the fuse unit at the outer face of said sealing disk to shift radially of the casing axis, the casing having an annular inwardly facing keeper abutment disposed to receive said segments when said sealing flange abuts said wall at the opposite end of the casing, and lock-operating means borne by the fuse unit to shift said segments in unison radially of the casing to lockably engage said keeper abutment, the fuse unit, the sealing disk and the locking segments being withdrawable as a unit through the open end of the casing away from said end wall upon release of said locking means at opposite ends of the casing.

12. An electric fuse structure comprising a tubular casing open at one end and having an apertured end wall at its other end; a fuse unit extending through said casing and comprising a fuse strip, terminal blades joined to the opposite ends of said fuse strip one of said blades projecting outward through said aperture and the other projecting outward through the opposite open end of the casing, a rigid bar of insulation also joining said blades to hold them together as a unit when the fuse is blown, a sealing disk fixed to and surrounding the terminal blade at said opposite end of the casing and having an annular baffle flange with its edge directed inwardly of the casing, the casing having an outwardly opening annular internal groove into which said flange extends to baffle escape of fire, and a sealing flange borne by and surrounding the other terminal blade to abut the inner face of said casing end wall to prevent escape of fire through said aperture, locking means adapted to engage the terminal and operable to hold said sealing flange in sealing position; a sealing disk locking means carried by the fuse unit at the outer face of said sealing disk and adapted to engage the casing outward of its said baffle groove and operable to locked position when said sealing flange abuts said end wall at the opposite end of the casing, and means borne by the fuse unit to operate the sealing-disk locking means, the fuse unit and the sealing disk and its locking means being withdrawable as a unit from the casing away from said end wall upon release of said locking means at opposite ends of the casing.

13. An electric fuse structure comprising a tubular casing open at one end and having an apertured end wall at its other end; a fuse unit extending through said casing and comprising a fuse strip, terminal blades joined to the opposite ends of said fuse strip, one of said blades projecting outward through said aperture, and the other projecting outward through the open end of the casing; a sealing flange carried by one

terminal blade within the casing to abut the inner face of the end wall of the casing to close the aperture therein; a sealing disk fixed to the terminal blade at the open end of the casing and formed with an annular baffle flange with its edge directed inwardly of the casing, the casing being formed with an outwardly opening annular internal groove into which said flange extends to baffle escape of fire; a sealing-disk locking means carried by the fuse unit at the outer face of said sealing disk to engage the casing and center the sealing disk therein and lock it against longitudinal or transverse movement in the casing.

14. An electric fuse structure comprising a tubular casing open at one end and having an apertured end wall at its other end; a fuse unit extending through said casing and comprising a fuse strip, terminal blades joined to the opposite ends of said fuse strip, one of said blades projecting outward through said aperture, and the other projecting outward through the open end of the casing; a sealing flange carried by one terminal blade within the casing to abut the inner face of the end wall of the casing to close the aperture therein; a sealing disk fixed to the terminal blade at the open end of the casing and formed with an annular baffle flange with its edge directed inwardly of the casing, the casing being formed with an outwardly opening annular internal groove into which said flange extends to baffle escape of fire; a sealing-disk locking means carried by the fuse unit at the outer face of the sealing-disk and comprising radially shiftable locking elements to engage the internal surface of the casing and center the sealing disk in locked position within the casing.

15. An electric fuse structure including a tubular casing having an end wall with an aperture the other end of the casing being open; a fuse unit extending through said casing and insertible and removable through the open end of the casing and comprising a fuse strip, terminal members joined to the opposite ends of said strip and projecting from the opposite ends of said casing and one of which terminal members projects through said aperture in the casing end wall, a sealing abutment borne by the latter terminal member to abut the inner face of said end wall to prevent escape of fire through said aperture, a closure disk for the open end of the casing fixed to the other terminal member, and expansible locking means borne by the latter terminal member and adapted to engage the casing to rotatively lock said closure disk and the terminal carrying said disk to the casing.

16. An electric fuse structure including a tubular casing open at one end and having an apertured end wall at its other end; a fuse unit extending through said casing and insertible and removable through the open end of the casing and comprising a fuse strip, terminal members joined to the opposite ends of said strip and projecting from the opposite ends of said casing and one of which terminal members projects through said aperture in the casing end wall, a sealing abutment fixed to the latter terminal member to abut the inner face of said end wall to prevent escape of fire through said aperture, a closure disk for the opposite open end of the casing fixed to the other terminal member and adapted to close the said casing and to be removed with the fuse unit, and locking means for said fuse unit comprising a keeper abutment on the casing adjacent the open end thereof and facing longitudinally inwardly of the casing, and locking devices carried by said closure disk and disposed to register with said keeper abutment when said sealing abutment at the opposite end of the unit contacts said end wall and mounted on said disk to shift transversely of the axis of the casing into and out of locking relation to said keeper abutment.

17. An electric fuse structure including a tubular casing open at one end and having an apertured end wall at its other end; a fuse unit extending through said casing and insertible and removable through the open end of the casing and comprising a fuse strip, terminal members joined to the opposite ends of said strip and projecting from the opposite ends of said casing and one of which terminal members projects through said aperture in the casing end wall, a sealing abutment fixed to the latter terminal member to abut the inner face of said end wall to prevent escape of fire through said aperture, a closure disk for the opposite open end of the casing fixed to the other terminal member and adapted to close the said casing and to be removed with the fuse unit, and locking means for said fuse unit comprising a keeper abutment on said casing adjacent to the open end thereof and facing longitudinally inwardly of the casing, a plurality of locking members carried by said disk and spaced around the axis of the casing and disposed to register with said keeper abutment when said sealing abutment at the opposite end of the unit contacts with said end wall and mounted on said disk to shift into and out of locking relation to said keeper abutment, and manually operable means borne by said disk to shift said locking members into and out of locking rotation to said keeper abutment.

18. An electric fuse structure including a tubular casing open at one end and having an apertured end wall at its other end; a fuse extending through said casing and insertible and removable through the open end of the casing and comprising a fuse strip, terminal members joined to the opposite ends of said strip and projecting from the opposite ends of said casing and one of which terminal members projects through said aperture in the casing end wall, a sealing abutment fixed to the latter terminal member to abut the inner face of said end wall to prevent escape of fire through said aperture, a closure disk for the opposite open end of the casing fixed to the other terminal member and adapted to close the said casing and to be removed with the fuse unit and having an annular flange directed longitudinally inwardly of the casing, the casing having an annular internal groove to receive said flange to baffle escape of fire from the casing, and locking means carried by the closure disk and cooperable with the casing to lock said closure disk to the casing, and disposed for locking cooperation with the casing when said sealing abutment at the opposite end of the unit contacts said end wall.

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