May 8, 1956 S. R. SMITH, JR., ET AL 2,744,982

CIRCUIT INTERRUPTING DEVICE

Filed Aug. 24, 1953 2 Sheets-Sheet 1

Fig. 1.

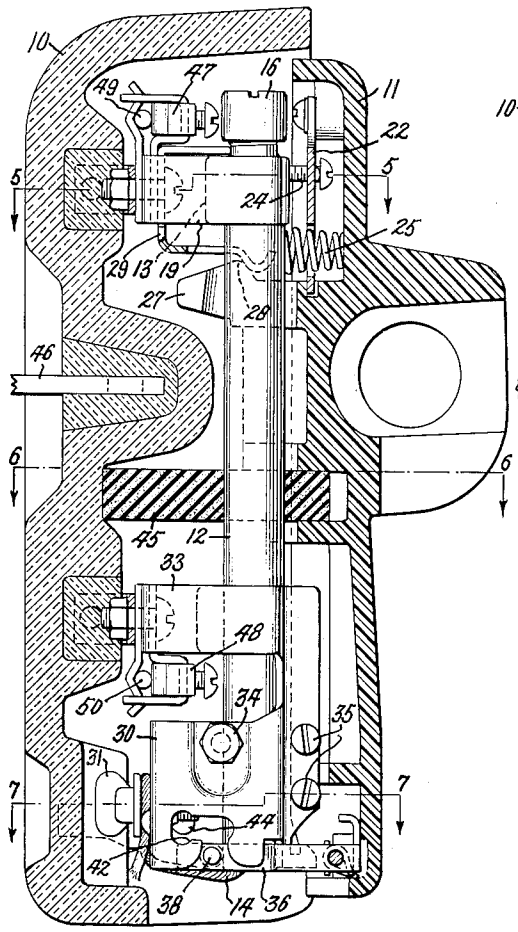


Fig. 2.

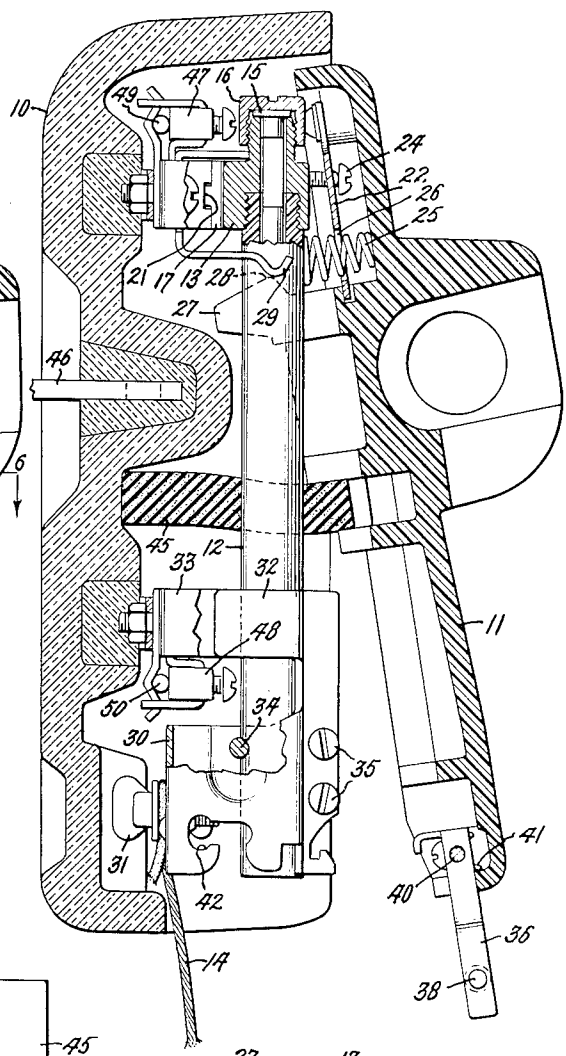


Fig. 3.

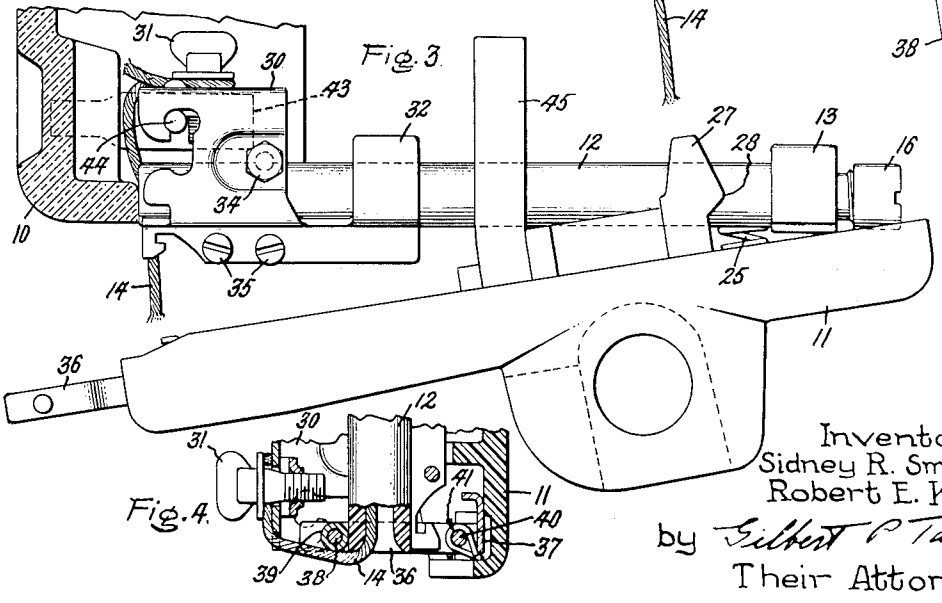


Fig. 4.

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May 8, 1956 S. R. SMITH, JR., ET AL 2,744,982

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Filed Aug. 24, 1953 2 Sheets-Sheet 2

Fig. 5.

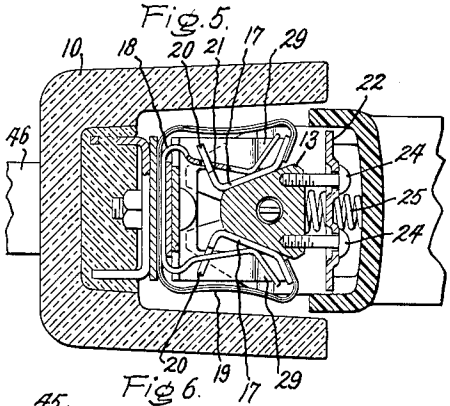


Fig. 6.

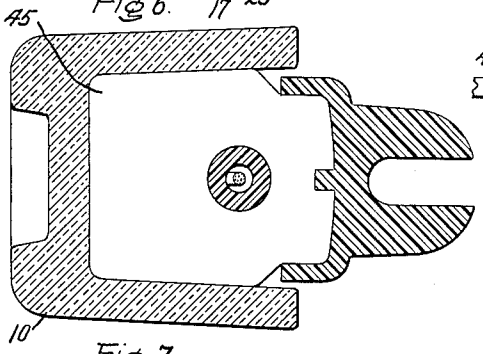


Fig. 7.

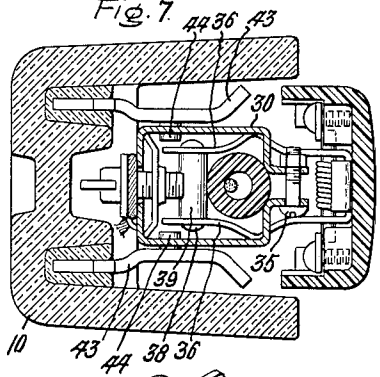


Fig. 10

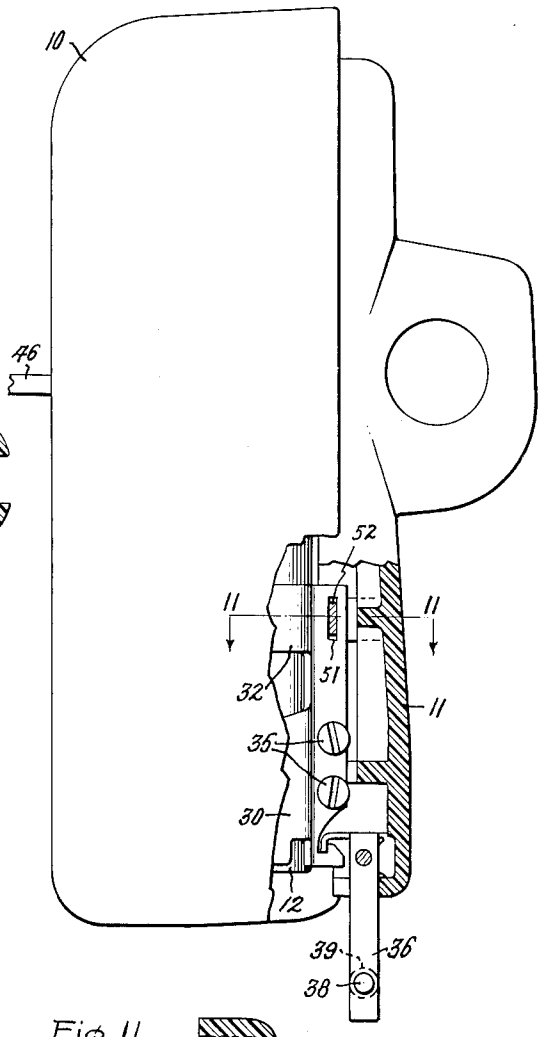


Fig. 11.

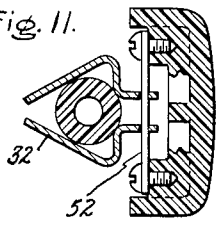
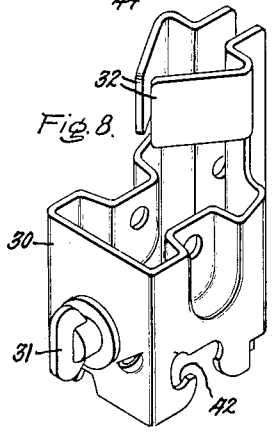


Fig. 8.



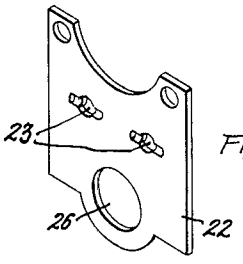


Fig. 9

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United States Patent Office 2,744,982 Patented May 8, 1956

2,744,982

CIRCUIT INTERRUPTING DEVICE

Sidney R. Smith, Jr., Stockbridge, and Robert E. Koch, Pittsfield, Mass., assignors to General Electric Company, a corporation of New York

Application August 24, 1953, Serial No. 375,902

23 Claims. (Cl. 200—114)

This invention relates to circuit interrupting devices, and more particularly, to fuse circuit interrupting devices and cutouts of the enclosed type.

One form of known enclosed type fuse cutout comprises a box-like housing closed by a door. On the door is mounted a fuse tube having a fusible element therein. The fuse tube carries upper and lower contacts which are engageable with upper and lower terminal contacts mounted in the rear of the housing. When the door is closed an electrical circuit is completed from the upper terminal contact to the lower terminal contact via the fusible element. Upon the occurrence of a fault in the line the fusible element will fuse and the electrical circuit will be interrupted.

Inasmuch as cutouts are usually mounted on pole lines or the like, where they are not readily accessible for inspection, it is desirable to construct the cutout so that it will give a visual indication of fusing of the fusible element which will be readily viewable from the ground. In some known forms of cutouts, as the dropout type, upon fusing of the fusible element the door of the cutout will be moved to cause unlatching of the door, whereupon the fuse tube and door will be free to flip open, thereby giving a clearly visible indication of a fault condition on the line.

One of the problems in the dropout type of cutout is how to ensure large surface area contact engagement between the fuse tube contacts and the stationary terminal contacts, and still not have said contact engagement interfere with the unlatching operation. In order to ensure reliable unlatching of the door, large surface area contact engagement has been sacrificed, and the mechanisms provided for movement of the door to cause unlatching have complicated the cutout and accordingly have made the cutout rather expensive.

In other known forms of cutouts a semaphore has been provided which upon fusing of the fusible element protrudes out from the bottom of the housing. However, some of these semaphore mechanisms are complicated, and, as far as applicants are aware, none of the cutouts employing said semaphore mechanisms also use said semaphore mechanisms as the release mechanism for dropout indication of a fault condition.

It is an object of this invention to provide a floating terminal contact construction for a cutout whereby large surface engagement between the terminal contacts and the fuse tube contacts will be ensured without interfering with the unlatching operation of the door of the cutout for dropout indication.

It is a further object of this invention to provide a reliable, low cost cutout, having relatively few parts, whereby when the fusible element of said cutout fuses the door of the cutout will move to unlatch itself for dropout action of the door and fuse tube.

It is a further object of this invention to provide a cutout which is capable of dropout fault indication and semaphore fault indication, the semaphore mechanism

comprising the release mechanism for said dropout indication.

It is a further object of this invention to provide a cutout having floating contacts engageable with a fuse tube which has a door hinged thereon for only pivotal movement with respect thereto, said door being held closed by a novel flipper arm and latching mechanism whereby when the fusible element of the cutout fuses said flipper arm releases said door for unlatching movement solely by pivotal movement of said door with respect to said fuse tube whereby said fuse tube and door is free to flip open.

Our invention comprises a floating contact construction, comprising a U-shaped spring clip member having a base portion connecting two leg portions, said leg portions first approaching each other from said base portion, and then diverging from each other at their ends, a plurality of flexible metallic strips surrounding said U-shaped member but spaced from said leg portions and terminating adjacent said diverging ends, and a floating contact shoe connected at one end thereof to the terminating ends of said plurality of flexible strips, said contact shoes having tabs formed at their other ends, said tabs entering notches formed in said approaching leg portions, said shoes disposed with respect to each other at an acute angle and capable of pivotal movement about either of their ends and fulcrumed movement about the portions of said member positioned between said approaching and diverging leg portions.

Our invention further comprises a cutout comprising a box-like housing having upper and lower terminal contacts, a fuse tube spanning said terminal contacts, upper and lower contacts on said fuse tube electrically engaging said terminal contacts, a fuse link within said fuse tube electrically connected at opposite ends thereof to said upper and lower fuse tube contacts and completing an electrical circuit from said upper terminal contact to said lower terminal contact, said fuse tube pivoted to said housing at the lower end thereof, a housing door pivoted to said fuse tube adjacent the upper end thereof, means for latching said door to said housing to keep said door closed and spring means for pivoting said door with respect to said fuse tube to unlatch said door, and means for prohibiting said pivotal movement of said door comprising a spring biased flipper arm pivoted at one end thereof on the lower portion of said door, said flipper arm having at its other end a roller, said roller engageable with a side of said fuse tube opposite to the side of said fuse tube facing said door, the lower end of said fuse link passing around said roller and retaining said arm substantially normal to said door and said roller in contact with said opposite fuse tube side.

Our invention further comprises a cutout comprising a housing having spaced upper and lower terminal contacts therein spanned and electrically connected by a tube having circuit interrupting means therein and pivoted adjacent a lower end thereof to a lower portion of said housing, a door hinged at the upper portion thereof to the upper portion of said tube, said tube being axially immovable with respect to said housing and said door, latch means for keeping said door closed and means for causing pivotal movement of said door with respect to said tube whereby said door is unlatched solely by said pivotal movement, said door being released for said pivotal movement by means responsive to said circuit interrupting means.

The invention will be better understood by considering the following description taken in connection with the accompanying drawings and its scope will be pointed out in the appended claims.

In the drawings, Fig. 1 is a partly sectional side view

of our cutout in the closed position. Fig. 2 is a similar view of our cutout during its unlatching operation following rupture of the fusible element. Fig. 3 is a side view of our cutout in its full dropout position. Fig. 4 is a side view of the bottom portion of our cutout, certain parts being broken away to better illustrate our flipper arm. Fig. 5 is a sectional view of our cutout taken along the line 5—5 of Fig. 1. Fig. 6 is a sectional view of our cutout taken along the line 6—6 of Fig. 1. Fig. 7 is a sectional view of our cutout taken along the line 7—7 of Fig. 1. Fig. 8 is a perspective view of the hinge element of our cutout. Fig. 9 is a perspective view of the plate used in our cutout to provide pivotal mounting of the door with respect to the fuse tube. Fig. 10 is a partly broken away side view of our cutout when adapted for non-dropout semaphore indication. Fig. 11 is a sectional view of our cutout taken along the line 11—11 of Fig. 10. Like reference numerals throughout the various figures are used to indicate similar parts.

Referring now to the drawings, and, more particularly to Fig. 1, shown therein is an enclosed type cutout or circuit interrupting device comprising a box-like porcelain or other electrical insulating material housing **10**, and a molded plastic or other electrical insulating material door **11**. Carried by door **11** is an electrical insulating material fuse tube **12**. As will appear more clearly hereinafter, the door **11** and fuse tube **12** are pivotally mounted with respect to each other adjacent their upper ends. As is well known in the prior art, the fuse tube **12** is constructed out of a material that will evolve a deionizing gas under electrical arcing conditions.

As shown more clearly in Figs. 2 and 5, the fuse tube **12** has mounted on its upper end, as by threads or the like, a wedge-shaped metallic contact **13** having a bore therein aligned with the bore in the fuse tube **12**. An electrically conductive fuse link **14** having a metallic button head **15** at its upper end is positioned within fuse tube **12**, and the lower end of the fuse link **14** extends out of the open bottom end of fuse tube **12**. As is well known in the prior art, the fuse link **14** has a fusible portion, not shown, which will fuse on overload. Wedge-shaped contact **13** has an upper externally threaded cylindrical portion on which is screwed a metallic fuse tube cap **16** to electrically fasten the button head **15** to wedge-shaped contact **13**.

Cooperative with wedge-shaped contact **13** are two metallic floating contact shoes **17** disposed with respect to each other at an acute angle in a V-shaped manner. Still referring to Figs. 2 and 5, it will be seen that a metallic U-shaped spring clip **18** is positioned opposite wedge-shaped contact **13** when fuse tube **12** is in its upright position. Surrounding the U-shaped spring clip **18** are a plurality of thin flexible metallic strips **19**. Floating contact shoes **17** are fastened, as by welding or the like, at one end thereof to the ends of the plurality of thin flexible metallic strips **19**. The other ends of the floating contact shoes **17** have tabs **20** thereon which enter notches **21** formed in opposite leg portions of U-shaped spring clip member **18**.

In some prior terminal contact constructions the terminal contacts have too much friction with respect to the fuse tube contacts to permit reliable unlatching and dropout operation of the door. Also, wedge or V-shaped contacts are difficult to keep aligned if made in the form of rigid clips. Therefore, in our invention the V-shaped contact shoes **17** are made free floating to provide a minimum of friction drag with respect to wedge-shaped contact **13**. Since, contact shoes **17** are free floating they will align themselves automatically with the surfaces of wedge-shaped contact **13** for large surface area contact. As seen from Fig. 5, the legs of U-shaped spring clip member **18** first approach each other and then diverge from each other at their ends. The plurality of flexible strips **19**, which preferably are constructed out of copper, surround the legs of U-shaped member **18** but are spaced therefrom and terminate adjacent the diverging ends of the U-shaped member legs. The shoes **17** are capable of pivotal movement about either of the ends, and also are capable of fulcruming about the portions of the U-shaped member **18** which are positioned between the approaching and diverging leg portions of U-shaped member **18**.

Referring now to Figs. 1, 2, 5 and 9, the pivotal mounting of the fuse tube **12** and door **11** with respect to each other will now be described. A metallic plate **22**, shown in perspective in Fig. 9, is attached to the inside face of door **11** opposite to wedge-shaped contact **13** as by screws or the like at the upper end of plate **22**, and grooves or the like formed in a portion of the door **11** adjacent the lower end of plate **22**. In plate **22** are apertures **23** through which pass bolts **24** whereby fuse tube **12** is axially immovable with respect to door **11**. The bolts **24** are fastened at one end thereof to wedge-shaped contact **13**. The opposite ends of the bolts **24** have heads formed thereon to retain the fuse tube **12** and door **11** together. The apertures **23** have a diameter slightly larger than the diameters of the bolts **24** to enable the door **11** and fuse tube **12** to pivot with respect to each other about bolts **24** as shown in Fig. 2. Pivotal movement of door **11** and fuse tube **12** with respect to each other is attained by virtue of a metallic spring **25**. Spring **25** passes through an aperture **26** in plate **22** and at opposite ends abuts door **11** and fuse tube **12**. As will appear more clearly hereinafter, in the unfused condition of fuse link **14**, the door **11** and fuse tube **12** are held together at their lower ends in parallel relationship with respect to each other. However, when fuse link **14** is ruptured upon overload the lower ends of door **11** and fuse tube **12** are no longer held with respect to each other. This permits the spring **25** to hinge door **11** away from fuse tube **12** about bolts **24**, as illustrated in Fig. 2. As seen in Figs. 1 to 3, the door **11** has two oppositely disposed electrical insulating material fork-like latching projections **27** integrally extending from door **11** and surrounding fuse tube **12**. These two latching projections define an oval-like aperture therebetween sufficiently large to permit the door **11** to move from the Fig. 1 position to the Fig. 2 position with respect to fuse tube **12** under the driving action of spring **25**. When the door has pivoted about bolts **24** with respect to the fuse tube **12** to the position illustrated in Fig. 2 further pivotal movement is arrested inasmuch as the inturned ends of latching projections **27** will abut the fuse tube **12**. Each of the latching projections is located longitudinally below and adjacent to wedge-shaped contact **13**. Also, each of the latching projections has on its upper surface a humped latching portion **28**. These latching humps **28** are each engaged by a metallic spring latching finger **29**, only one of which is shown, to keep the door closed. Each of latching fingers **29** extend along opposite sides of fuse tube **12** and are rigidly connected to and extend from the rear wall of box-like housing **10**. As will appear more clearly later, when door **11** pivots about bolts **24** with respect to fuse tube **12** to the position illustrated in Fig. 2 upon rupture of the fuse link **14**, the latching humps **28** will become disengaged from latching fingers **29** solely by virtue of said pivotal movement whereupon the door and fuse tube **12** will be free for dropout movement to the position illustrated in Fig. 3. Preferably the projections **27** are integrally molded plastic portions of door **11**. Metal-to-plastic contact latching of door **11** by engagement of metallic fingers **29** and plastic projections **27** provides a door latch which is not subject to corrosion as in the case of metal-to-metal contact.

Referring now to Figs. 4, 7 and 8, the construction of the lower portion of our cutout and our novel flipper arm mechanism will now be described. Surrounding the lower end of fuse tube **12** is a metallic hinge element **30** shown in perspective in Fig. 8. Hinge element **30** has a metallic fuse link fastening member **31** and an integral metallic wedge-shaped contact portion **32**. Wedge-shaped contact portion **32** is engaged by a floating contact shoe construction, indicated generally by reference

numeral 33, similar to the floating contact shoe construction 17—21 engaging upper wedge-shaped contact 13 and hereinbefore described.

The fuse tube 12 passes between the tabs defining lower wedge-shaped contact portion 32 and the sides of the hinge element 30. Hinge element 30 is fastened to fuse tube 12 by bolts 34 and 35 disposed on opposite sides of fuse tube 12 and passing through opposite sides of hinge element 30. As seen clearly in Fig. 2, bolt 34 engages a groove in fuse tube 12 perpendicular to the axis of fuse tube 12 to keep the fuse tube 12 and hinge element 30 from sliding axially with respect to each other.

Pivotally connected to the lower end of door 11 at the inside portion thereof is a spring biased metallic U-shaped flipper arm. Said flipper arm has two legs 36 joined by a base portion 37. The ends of legs 36 opposite to base portion 37 have a metallic pin 38 passing therethrough and said pin 38 carries a metallic roller 39. The end of the spring biased U-shaped flipper arm opposite to roller 39 is pivotally connected to door 11 as by a pin 40 journaled at opposite ends in portions of door 11 and passing through legs 36 adjacent base portion 37. The U-shaped flipper arm is biased for pivotal movement from a position perpendicular to door 11 as shown in Fig. 1, to a position parallel to and lying in the plane of door 11 as shown in Fig. 2, by a metallic spring 41 surrounding pin 40, and whose opposite ends abut a portion of the door 11 and base portion 37 as shown in Fig. 4.

As seen in Fig. 8, the hinge element 30 has integral hook portions 42 disposed on opposite sides of hinge element 30. The box-like housing 10 has two metallic bearing arms 43, see Fig. 7, projecting from the rear wall thereof adjacent the lower portion of housing 10 and each of arms 43 has metallic bearing trunnions 44 or the like. The fuse tube 12 with its upper and lower wedge-shaped contacts 13 and 32, respectively, is pivotally mounted with respect to housing 10 and its stationary upper and lower floating contacts 17—21 and 33, respectively by hooking hook portions 42 of hinge element 30 on the bearing trunnions 44 of bearing arms 43 as illustrated in Figs. 1 to 3, whereby the fuse tube 12 is axially immovable with respect to housing 10.

Shown in Figs. 1 and 6 is a sponge rubber or other electrical insulating material barrier 45 dividing the cutout housing 10 into upper and lower chambers when the cutout is closed to isolate the upper cutout contacts 13 and 17—21 from the lower cutout contacts 32 and 33. This electrical insulating material barrier 45 ensures against electrical flashover between the hardware within the upper and lower chambers defined by said barrier 45.

As is well known in the prior art, the cutout is supported from a pole line or the like by a metallic support member 46 cemented or otherwise fastened to the cutout housing 10. Also, metallic terminals or clamps 47 and 48 are electrically connected, respectively, to upper and lower stationary floating contacts 17—21 and 33, whereby line leads 49 and 50 may be brought into the housing 10 through appropriate apertures, not shown, in a side wall of housing 10 for connection to terminals 47 and 48, respectively. The clamps 47 and 48, the combination clamp, latch and contact device such as parts 47, 29 and 17—21, the combination clamp and latch such as parts 47 and 29, and the combination clamp and contact device such as parts 47 and 17—21 or 48 and 33 are not part of our invention but comprise the sole invention of Robert E. Koch and are more particularly described and claimed in copending patent application Serial No. 468,717, filed November 15, 1954, and assigned to the same assignee as the instant patent application.

In Fig. 1 our cutout is shown in its closed position. Upper wedge-shaped contact 13 is in electrical contact with upper stationary floating contact 17—21, lower wedge-shaped contact 32 is in electrical contact with lower stationary floating contact 33, and the door 11 is parallel to fuse tube 12. The spring biased U-shaped flipper arm is positioned perpendicular to door 11, and as seen more clearly in Figs. 4 and 7, the roller 39 engages a side of fuse tube 12 at the endmost portion of fuse tube 12. The end of fuse link 14 which extends out from the open bottom end of fuse tube 12 passes around roller 39 and is tautly fastened to hinge element 30 at fuse link fastening member 31. Thus, the tautly fastened unruptured fuse link 14 holds the flipper arm perpendicular to door 11 against the counterclockwise biasing action of spring 41 whereby roller 39 will be in engagement with a side of the endmost portion of fuse tube 12 so that the door 11 and fuse tube 12 are held parallel with respect to each other. In this condition of the cutout spring 25 cannot pivot door 11 about bolts 24 with respect to fuse tube 12; and with the door slammed shut, the latching fingers 29 engage the latching humps 28 of latching projections 27 to keep the door closed with respect to housing 10.

In the Fig. 1 position of our cutout an electrical circuit is established from line lead 49 through terminal 47, upper floating contact 17—21 and upper wedge-shaped contact 13 through fuse link 14 to fuse link fastening member 31, hinge element 30, lower wedge-shaped contact 32, lower floating contact 33 and terminal 48, to line lead 50.

Upon the occurrence of an overload in the line the fusible portion of fuse link 14 will fuse. An electrical arc struck between the fused ends of fuse link 14 will generate a deionizing gas within fuse tube 12, said gas aiding in the extinguishment of said electrical arc. Simultaneously, since the fuse link 14 is now ruptured, the spring biased U-shaped flipper arm is now free to be pivoted in a counterclockwise direction by flipper arm spring 41. The roller 39 will roll off the end of fuse tube 12 and as the flipper arm pivots counterclockwise it will withdraw the lower fused portion of fuse link 14 from fuse tube 12 so that the distance between the fused ends of fuse link 14 is increased whereby the electrical circuit through the cutout is interrupted and the electrical arc between the fused ends of fuse link 14 is effectively extinguished. See Fig. 2.

As soon as the roller 39 rolls off the lower end of fuse tube 12 the door 11 and fuse tube 12 are no longer held parallel with respect to each other. Accordingly, the spring 25 is free to cause the door 11 to pivot about bolts 24 with respect to fuse tube 12. As seen in Fig. 2, such pivotal action of door 11 frees latch humps 28 from latching fingers 29 whereby the door 11 is no longer latched closed. The stationary floating contacts 17—21 and 33 cooperative with the fuse tube wedge-shaped contacts 13 and 32 do not perform any latching function and accordingly are unable to hold the door 11 and fuse tube 12 from pivoting about trunnions 44 to the dropout position illustrated in Fig. 3. In fact, by viewing Fig. 5, it will be apparent that when wedge-shaped contact 13 fully engages floating contact shoes 17 when the door is slammed shut the legs of U-shaped spring clip 18 are flexed away from each other; and that this deflexion of the legs of U-shaped spring clip 18 in conjunction with the sloping surfaces of contact 13 and contact shoes 17 will result in a tendency for the wedge-shaped contacts and contact shoes to become disengaged as soon as latching humps 28 are free of latching fingers 29. This, in combination with the weight of door 11 and fuse tube 12 plus the weight of the hardware mounted thereon, will cause the door 11 and fuse tube 12 to flip open to the Fig. 3 position. Pivotal clockwise dropout movement of the door 11 and fuse tube 12 is arrested at about an angle of 90 degrees with respect to housing 10 inasmuch as the bottom end of fuse tube 12 will abut a bottom portion of housing 10. The bottom portion of housing 10 is suitably cutaway to permit said 90 degree clockwise movement.

With the cutout in the Fig. 3 position a clearly visible indication is given of overload conditions on the line.

Thus, it will now be apparent that our cutout provides means for unlatching and dropout operation of the door 11 which is reliable and has relatively few parts. To unlatch the door 11 only hinged movement of the door with respect to the fuse tube is required. No axial movement of the fuse tube 11 with respect to housing 10 or door 11 is necessary. The door release mechanism is a simple cable flipper arm with a roller 39 at its end. The roller 39 is mounted for rotary movement on pin 38 and freely rolls off the lower end of fuse tube 12 to reliably release the door for unlatching movement with no sticking, jamming, or the like. Further, as will appear more clearly hereinafter, our cutout can be readily adapted for non-dropout semaphore fault indication, the cable flipper arm serving as the semaphore indicator mechanism.

To refuse the cutout the door and fuse tube assembly is removed from housing 10 by unhooking hook portions 42 from trunnions 44. By unscrewing cap 16 a new fuse link 14 can be inserted in fuse tube 12. While fuse tube 12 is held parallel to door 11 the flipper arm can be moved perpendicular to door 11 whereby roller 39 will engage the bottom of the fuse tube 12, after which the new fuse link 14 can be brought around roller 39 and fastened to fuse link fastening member 31. The outer side of the door 11 has a combined switch stick socket and door handle to facilitate removement and replacement of the door and fuse tube assembly with respect to the housing 10 by using a conventional switch stick. However, this combined switch stick socket and door handle is not part of our invention but comprises the sole invention of Francis L. Flanagan and is more particularly disclosed and claimed in co-pending patent application Serial No. 450,505, filed August 17, 1954, and assigned to the same assignee as the instant patent application.

Referring now to Figs. 10 and 11, shown therein is our device when it has been adapted for non-dropout semaphore indicator action. The opposite sides of hinge element 30 have aligned notches 51 formed therein. A bar 52 passes through notches 51 and is positioned between the fuse tube 12 and door 11. Opposite ends of bar 52 are fastened to door 11 by screws or the like. Thus, in this condition of our device the fuse tube 12 and door 11 are held parallel with respect to each other by means independent of the flipper arm whereby the door will not become unlatched for dropout action upon fusing of fuse link 14. The flipper arm which serves as the release mechanism for unlatching and dropout action of door 11 now serves as a semaphore to give an indication of a fault on the line, said semaphore being easily viewable from the ground. As in dropout action of our device, when our device is arranged for only semaphore indication, the flipper arm will still extract the lower fused portion of fuse link 14 from within the fuse tube 12. With fuse tube 12 and door 11 held parallel with respect to each other by bar 52, when a fault occurs on the line the fuse link 14 will rupture. After rupture of fuse link 14 the flipper arm will no longer be held perpendicular to door 11. Accordingly, the roller 39 will roll off the end of fuse tube 12 and the flipper arm will be driven by spring 41 counterclockwise about 90 degrees whereupon the flipper arm will protrude out from the bottom of housing 10 to signal a fault on the line.

While there has been shown and described a particular embodiment of the invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention, and that it is intended by the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent in the United States is:

1. In a device having two metallic contacts engageable and disengageable with each other, one of said contacts being wedge-shaped, the other of said contacts comprising two spaced floating metallic contact shoes disposed opposite to each other in a wedge-shaped manner, each of said shoes engageable with an opposite side of said one wedge-shaped contact, each of said shoes being floatingly mounted by being connected adjacent the widely spaced ends thereof to ductile metallic strips and having tabs formed adjacent the closely spaced ends thereof loosely disposed in a pair of apertures whereby each of said shoes is free for pivotal movement about either of its opposite ends.

2. In a device having two metallic contacts engageable and disengageable with each other, one of said contacts being wedge-shaped, the other of said contacts comprising two spaced floating metallic contact shoes disposed opposite to each other in a wedge-shaped manner, each of said shoes engageable with an opposite side of said one wedge-shaped contact, each of said shoes supported adjacent the widely spaced ends thereof by ductile metallic strips and having tabs formed adjacent the closely spaced ends thereof loosely disposed in a pair of apertures, and each of said shoes bearing adjacent the central portions of the outer sides thereof against fulcrum points whereby each of said shoes is free for pivotal movement about a central portion thereof.

3. In a device having two metallic contacts engageable and disengageable with each other, one of said contacts being wedge-shaped, the other of said contacts comprising two spaced floating metallic contact shoes disposed opposite to each other in a wedge-shaped manner, each of said shoes engageable with an opposite side of said one wedge-shaped contact, each of said shoes supported at the widely spaced ends thereof by thin ductile copper strips connected thereto and having portions thereof at the closely spaced ends thereof loosely disposed in a pair of apertures, and portions of each of said shoes between opposite ends thereof at the outer faces thereof adapted to bear against pivot points whereby each of said shoes is free for pivotal movement in opposite directions about either of its opposite ends and for pivotal movement in opposite directions about a portion of said shoes disposed between said opposite ends.

4. In a device having two metallic contacts engageable and disengageable with each other, one of said contacts being wedge-shaped, the other of said contacts comprising a U-shaped metallic spring clip member having two opposed leg portions disposed on opposite sides of said one wedge-shaped contact, and two spaced metallic contact shoes disposed between said opposed leg portions and said opposite sides, said contact shoes making contact with said opposite sides, each of said contact shoes connected adjacent the outer end portions thereof to thin ductile metallic strips and having portions thereof adjacent the inner end portions thereof loosely disposed in a pair of apertures formed in said clip member leg portions.

5. In a device having two metallic contacts engageable and disengageable with each other, one of said contacts being wedge-shaped, the other of said contacts comprising a U-shaped metallic spring clip backing member having a base connecting two opposed legs, portions of said legs adjacent said base extending from said base and converging towards each other and then diverging away from each other, other portions of said legs between said converging and diverging portions disposed on opposites sides of said one wedge-shaped contact, and two spaced independently movable floating metallic contact shoes disposed between said other portions and said opposite side and adapted to make contact with said opposite sides and other portions, said shoes loosely mounted with respect to said legs and being connected adjacent the outer end portions thereof to thin ductile copper strips electrically connected to said backing member whereby said shoes can fulcrum independently of each other at their central portions about said other portions in opposite directions.

6. In a device having a pair of contacts engageable and disengageable with each other, one of said contacts comprising a wedge-shaped contact having two opposite sides disposed with respect to each other at an acute angle, the other of said contacts comprising a U-shaped spring backing member having a base connecting two opposed legs, the ends of said legs adjacent said base diverging away from each other from central portions of said legs towards said base, the ends of said legs opposite to said base diverging away from each other from said central portions to said opposite leg ends, said central portions disposed adjacent said opposite sides, a floating contact shoe disposed between each of said central portions and each of said opposite sides and adapted to make surface contact with each of said opposite sides, said floating contact shoes disposed with respect to each other at an acute angle and floatingly mounted with respect to said U-shaped member, one end of said shoes disposed on one side of said central portions and opposite ends of said shoes disposed on another side of said central portions, said one shoe ends having tabs formed thereon, said tabs disposed within notches formed in said legs, and said opposite shoe ends connected to said U-shaped member by thin flexible metallic strips.

7. A floating contact shoe construction comprising a U-shaped spring backing member having two opposed leg portions connected by a base portion, said leg portions extending from said base portion towards each other and then extending away from each other from a central portion thereof to the ends of said legs remote from said base portion, two oppositely disposed floating contact shoes disposed between said central portions at an acute angle with respect to each other, the apex of said acute angle pointing towards said base portion, the ends of said contact shoes remote from said apex positioned adjacent said remote leg ends and opposite ends of said contact shoes having tabs formed thereon, said leg portions having notches formed therein between said central portions and said base portion, said tabs disposed within said notches, and flexible metallic means connecting said remote shoe contact ends to said U-shaped member.

8. A floating contact shoe construction comprising a U-shaped metallic spring backing member having two opposed leg portions connected by a base portion, said leg portions angularly converging towards each other from the ends of said leg portions adjacent said base portion towards central portions of said leg portions and then angularly diverging away from each other from said central portions towards the ends of said leg portions remote from said base portion, two flat contact shoes centrally positioned between said central leg portions and disposed with respect to each other at an acute angle, the apex of said acute angle pointing towards said base portion, the ends of said shoes adjacent said apex having tabs formed thereon, said leg portions having notches therein between said central portions and said base portion, said tabs disposed within said notches, at least one flexible thin metallic strip surrounding said U-shaped member, opposite ends of said strip connected to the ends of said shoes remote from said apex, said strip spaced from said leg portions.

9. In a fuse cutout, an electrical insulating material fuse tube having upper and lower contacts, latching means for retaining said fuse tube contacts in conducting relationship with a pair of terminal contacts, means for initiating unlatching of said fuse tube contacts from said terminal contacts comprising an arm having a roller on an end thereof, said roller being held in engagement with an end of said fuse tube by a fuse link partially within said fuse tube.

10. A fuse cutout comprising an electrical insulating material fuse tube having upper and lower contacts, latching means for retaining said fuse tube contacts in conducting relationship with a pair of spaced terminal contacts, means for initiating unlatching of said fuse tube contacts from said spaced terminal contacts comprising

an arm having a roller on an end thereof, said roller being held in engagement with an end of said fuse tube by a fuse link partially within said fuse tube and passing over said roller whereby rupture of said fuse link releases said roller from engagement with said fuse tube end.

11. In a circuit interrupting device comprising an electrical insulating material housing having an upper and lower terminal contact mounted therein, an electrical insulating material tube disposed within said housing, said tube pivoted adjacent a lower portion thereof to a lower portion of said housing, an electrical insulating material door for said housing, said door pivotally connected adjacent an upper portion thereof to an upper portion of said tube, latching means for keeping said door closed, means for pivotally moving a lower portion of said door away from a lower portion of said tube to unlatch said latching means, and means for keeping said latching means latched against the action of said door moving means comprising a flipper arm pivotally connected adjacent one end portion thereof to a lower portion of said door, said flipper arm having a roller mounted adjacent an opposite end portion thereof, said roller engageable with a side of said tube furthest removed from said door adjacent a lower endmost portion of said tube.

12. In a circuit interrupting device comprising an electrical insulating material housing having an upper and lower terminal contact mounted therein, an electrical insulating material tube within said housing, said tube having upper and lower contacts engageable with said upper and lower terminal contacts, said tube pivoted adjacent a lower portion thereof to a lower portion of said housing, an electrical insulating material door for said housing, said door pivotally connected adjacent an upper portion thereof to an upper portion of said tube, latching means for keeping said door closed, said latching means positioned below said upper tube contact and said upper terminal contact, means for pivotally moving a lower portion of said door away from a lower portion of said tube to unlatch said latching means solely by pivotal movement of said door with respect to said tube, and means for keeping said latching means latched against the action of said door moving means comprising a flipper arm pivotally connected adjacent one end portion thereof to a lower portion of said door, said flipper arm having a roller mounted adjacent an opposite end portion thereof, said roller engageable with a side of said tube furthest removed from said door adjacent a lower endmost portion of said tube.

13. In a circuit interrupting device comprising an elongated electrical insulating material box-like housing having spaced upper and lower terminal contacts mounted therein, an electrical insulating material tube within said housing disposed opposite to said spaced contacts, said tube pivoted adjacent a lower end portion thereof to a lower end portion of said housing whereby said tube can be pivoted away from within said housing and said spaced contacts, said tube immovable axially with respect to said housing, an electrical insulating material door for said housing, said door pivotally connected adjacent an upper end portion thereof to an upper end portion of said tube whereby said door can be pivoted counterclockwise with respect to said tube to move a lower end portion of said door away from said lower end tube portion, said tube immovable axially with respect to said door, said tube having circuit interrupting means therein, means for holding said door and tube substantially parallel with respect to each other and for prohibiting said door from pivoting with respect to tube when said circuit interrupting means is closed, latching means for keeping said door closed and said tube within said housing opposite to said spaced contacts, said latching means comprising an electrical insulating material latching projection mounted on an inside surface of said door and integral therewith and a latching projection mounted within said housing engageable with said door mounted latching projection

when said door is closed, said door mounted latching projection having a raised latching hump on an upper surface thereof engageable with a depressed latching hump on a lower surface of said housing mounted latching projection whereby said latching means is adapted to be unlatched solely by clockwise pivotal movement of said door with respect to said tube, said housing mounted latching projection positioned between said spaced contacts and said door mounted latching projection positioned between said upper and lower end door portions, and means for pivoting said door counterclockwise with respect to said tube to unlatch said door upon opening of said circuit interrupting means.

14. An enclosed cutout comprising an elongated electrical insulating material box-like housing having spaced upper and lower metallic terminal contacts mounted therein, an electrical insulating material fuse tube having upper and lower metallic contacts mounted thereon positioned within said housing whereby said upper and lower fuse tube contacts make electrical contact with said upper and lower terminal contacts respectively, a fuse link partially within said fuse tube connected at opposite ends thereof to said upper and lower fuse tube contacts for completing an electrical circuit between said upper and lower terminal contacts, a pivotal connection between a lower end portion of said fuse tube and a lower portion of said housing whereby said fuse tube is free to pivot from within said housing away from said upper and lower terminal contacts, means for prohibiting said fuse tube from pivoting away from said upper and lower terminal contacts comprising an electrical insulating material door closing said housing, a hinged connection between an upper portion of said door and said upper fuse tube contact, an integral electrical insulating material latching projection protruding from an inside surface of said door below said upper fuse tube contact, said latching projection having a raised latching hump on an upper surface thereof, a resilient metallic latching projection mounted in said housing between said upper and lower terminal contacts having a depressed latching hump on a lower surface thereof engageable with said insulating material projection hump when said door is closed whereby said fuse tube contacts are engaged wtih said upper and lower terminal contacts, a spring positioned between said hinged connection and said insulating material projection and between said inside door surface and a side of said tube opposite to said inside surface for pivoting said door counterclockwise with respect to said fuse tube about said hinged connection whereby said door is unlatched and said fuse tube is free to pivot away from said terminal contacts, said fuse tube immovable axially with respect to said door, and means for prohibiting pivotal movement of said door with respect to said tube comprising a flipper arm pivoted to said door adjacent one end portion thereof to a lower portion of said door, an opposite end portion of said arm having a roller thereon for rolling engagement with a side of said tube furthest removed from said door adjacent a lower endmost portion of said tube, the lower end of said fuse tube being open and the lower end of said fuse link passing around said roller to retain said roller in engagement with said endmost tube portion side, said flipper arm being spring biased for counterclockwise movement upon rupture of said fuse link whereby said roller will roll off said endmost tube portion side to release said door for pivotal movement with respect to said tube for unlatching of said door.

15. In a circuit interrupting device comprising an electrical insulating material housing having spaced upper and lower metallic terminal contacts therein, an electrical insulating material tube within said housing hinged adjacent a lower portion thereof to a lower portion of said housing, said tube having spaced upper and lower metallic contacts thereon for engagement with said upper and lower terminal contacts respectively, said upper tube contact having a metallic wedge-shaped contact portion, said upper terminal contact comprising two loosely mounted floating metallic contact shoes disposed with respect to each other in a wedge-shaped manner, said shoes spring biased for broad surface engagement with opposite sides of said wedge-shaped contact portion whereby said tube is urged for hinged movement away from said spaced terminal contacts and from within said housing, means for retaining said tube contacts engaged with said terminal contacts comprising an electrical insulating material door for said housing, said door hinged adjacent an upper portion thereof to an upper portion of said tube, a latch adapted to be unlatched solely by hinged movement of said door with respect to said tube away for retaining said door closed and said tube contacts engaged with said terminal contacts, and releasable means for causing hinged movement of said door with respect to said tube to unlatch said latch whereby said spring biased shoes will urge said tube from within said housing.

16. In a circuit interrupter comprising an electrical insulating material housing having a metallic terminal contact therein, electrical insulating material tubular means hinged to said housing for hinged movement within and without said housing, said tubular means having a metallic contact portion defined by two sides disposed with respect to each other at an acute angle, said terminal contact comprising two metallic contact shoes disposed with respect to each other at an acute angle, the apexes of said acute angles directed in the same direction, said contact shoes loosely mounted for pivotal movement about either of their opposite end portions or central portions, said contact shoes spring biased for broad surface engagement with said sides and urging said tubular means from within said housing, and means for retaining said tubular means in said housing whereby said tubular means contact portion and terminal contact are engaged comprising an electrical insulating material door for said housing hinged to said tubular means, a latch for keeping said door closed and said tubular means contact portion and said terminal contact engaged, means for hinging said door with respect to said tubular means whereby said door is unlatched, and means for prohibiting hinged movement of said door with respect to said tubular means comprising an arm hinged to said door, said arm having a roller thereon engageable with a side of said tubular means adjacent an endmost portion of said tubular means.

17. In a circuit interrupting device comprising an electrical insulating material housing having two spaced metallic terminal contacts mounted therein, an electrical insulating material fuse tube having a pair of spaced metallic contacts thereon engageable with said terminal contacts, a rupturable fuse link disposed within said fuse tube electrically connected to said fuse tube contacts, an electrical insulating material door for said housing, said door pivotally hinged to said fuse tube for pivotal movement with respect thereto, latching means adapted to be unlatched solely by pivotal movement of said door with respect to said fuse tube for keeping said door closed and spring means for causing pivotal movement of said door with respect to said fuse tube upon rupture of said fuse link whereby said door is unlatched solely by said pivotal movement.

18. In a circuit interrupting device comprising an electrical insulating material housing having two spaced metallic terminal contacts mounted therein engageable by a pair of spaced metallic contacts carried by an electrical insulating material tubular member and electrically interconnected by a fuse link disposed within said tubular member, said tubular member hinged to said housing and capable only of hinged movement with respect to said housing, an electrical insulating material door for said housing, a pivotal connection between said door and tubular member whereby said door and tubular member are capable only of pivotal movement with respect to each other, latching means adapted to be unlatched

solely by pivotal movement of said door with respect to said tubular member for keeping said door closed, and means responsive to rupture of said fuse link for causing pivotal movement of said door with respect to said tubular member about said pivotal connection whereby said door is unlatched solely by said pivotal movement.

19. In a circuit interrupting device comprising an electrical insulating material housing having two spaced terminal contacts therein, a pair of spaced contacts carried by an electrical insulating material tube electrically connected by a fuse link disposed within said tube engageable with said terminal contacts, a pivotal connection between one end portion of said tube and one end portion of said housing whereby said tube can be pivoted about said pivotal connection to disassociate said tube carried contacts from said terminal contacts, an electrical insulating material door for said housing, a pivotal connection between said door and tube whereby said door can be pivoted with respect to said tube to move an end portion of said door adjacent said one end tube portion away from said one end tube portion, latching means adapted to be unlatched solely by pivotal movement of said door with respect to said tube for keeping said door closed, spring means for pivotally moving said door with respect to said tube whereby said latching means is unlatched solely by pivotal movement of said door with respect to said tube, means for prohibiting pivotal movement of said door with respect to said tube, said prohibiting means responsive to rupture of said fuse link whereby said spring means is free to cause pivotal movement of said door with respect to said tube to unlatch said latching means whereby said tube carried contacts are disassociated from said terminal contacts.

20. In a circuit interrupting device comprising an elongated electrical insulating material box-like housing having two spaced contacts therein adjacent opposite end portions thereof, an electrical insulating material tube within said housing having a pair of spaced contacts mounted thereon engageable with said first mentioned contacts, said tube mounted contacts electrically interconnected by a fuse link disposed within said tube, said tube pivoted adjacent one end portion thereof to one of said opposite end portions whereby said tube can be pivoted from within said housing away from said first mentioned contacts, said tube immovable in an axial direction with respect to said housing, an electrical insulating material door for said housing, a hinged connection between one end portion of said door and another end portion of said tube opposite to said one tube end portion whereby said door may be pivoted with respect to said tube about said hinged connection to move another end portion of said door adjacent said one tube end portion away from said one tube end portion, latching means for holding said door closed and prohibiting said tube from pivoting away from within said housing, said latching means adapted to be unlatched by pivotal movement of said another door end portion away from said one tube end portion, said latching means comprising a latching projection mounted on said door and a latching projection mounted in said housing, said latching projections engageable with each other when said door is closed, said housing mounted latching projection positioned between said first mentioned contacts and said door mounted latching projection positioned between said hinged connection and said another door end portion, said tube immovable axially with respect to said door, and means responsive to rupture of said fuse link for pivotally moving said door with respect to said tube.

21. In a circuit interrupting device comprising an electrical insulating material housing having an upper and lower terminal contact mounted therein, an electrical insulating material tube spanning said upper and lower terminal contacts, said tube having upper and lower contacts mounted thereon engageable with said upper and lower terminal contacts, said tube having a fuse link therein electrically interconnecting said tube mounted contacts, said tube pivoted adjacent a lower portion thereof to a lower portion of said housing, an electrical insulating material door for said housing, said door pivotally connected adjacent an upper portion thereof to an upper portion of said tube, latching means adapted to be unlatched solely by pivotal movement of said door with respect to said tube for keeping said door closed, said latching means positioned below said upper tube mounted contact and said upper terminal contacts, and means for pivotally moving a lower portion of said door away from a lower portion of said tube to unlatch said latching means solely by pivotal movement of said door with respect to said tube.

22. In a circuit interrupting device comprising an electrical insulating material housing having an upper and lower terminal contact mounted therein, an electrical insulating material tube having a fuse link partially therein disposed within said housing, said tube having upper and lower contacts thereon engageable with said terminal contacts, said tube contacts electrically interconnected by said fuse link, said tube pivoted adjacent a lower portion thereof to a lower portion of said housing, an electrical insulating material door for said housing, said door pivotally connected adjacent an upper portion thereof to an upper portion of said tube, latching means for keeping said door closed, means for pivotally moving a lower portion of said door away from a lower portion of said tube to unlatch said latching means by pivotal movement of said door with respect to said tube, means for keeping said latching means latched against the action of said door moving means comprising a flipper arm pivotally connected adjacent one end portion thereof to a lower portion of said door, said flipper arm having a roller mounted thereon adjacent an opposite end portion thereof, said roller engageable with a side of said tube furthest removed from said door adjacent a lower endmost portion of said tube, said roller and tube side engagement restraining said door moving means, said flipper arm being biased by a flipper arm biasing means for pivotal movement about said one end portion whereby said roller will roll off said endmost tube side to release said door moving means, said tube being open at the lower end thereof, said fuse link extending from said open end and passing over said roller to restrain said biasing means from causing said roller to roll off said endmost tube side.

23. In a circuit interrupting device comprising an electrical insulating material housing having spaced upper and lower metallic terminal contacts therein, tubular electrical insulating material means within said housing, said tubular means hinged adjacent a lower portion thereof to a lower portion of said housing, said tubular means having spaced upper and lower metallic contacts thereon for engagement with said upper and lower terminal contacts respectively, one of said tubular means contacts having a metallic wedge-shaped contact portion defined by two opposite sides, one of said terminal contacts engageable with said wedge-shaped contact portion and comprising two loosely mounted floating metallic contact shoes disposed opposite to each other in a wedge-shaped manner, said contact shoes spring biased for broad surface contact engagement with said opposite sides and urging said tubular means for hinged movement from within said housing away from said terminal contacts, and means for retaining said tubular means contacts in engagement with said terminal contacts comprising an electrical insulating material door for closing said housing, said door hinged with respect to said tubular means, a latch adapted to be unlatched by hinged movement of said door with respect to said tubular means for retaining said door closed and said tubular means contacts and terminal contacts engaged, and

means for causing hinged movement of said door with respect to said tubular means to unlatch said latch whereby said spring biased shoes are free to urge said tubular means for hinged movement from within said housing.

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