Aug. 13, 1935. E. M. MEYER 2,011,543

TRANSFORMER CUT-OUT

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Fig. 1

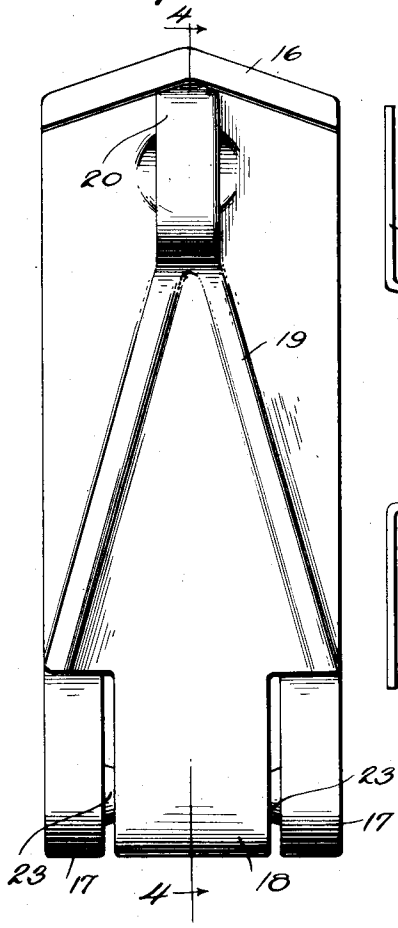


Fig. 2

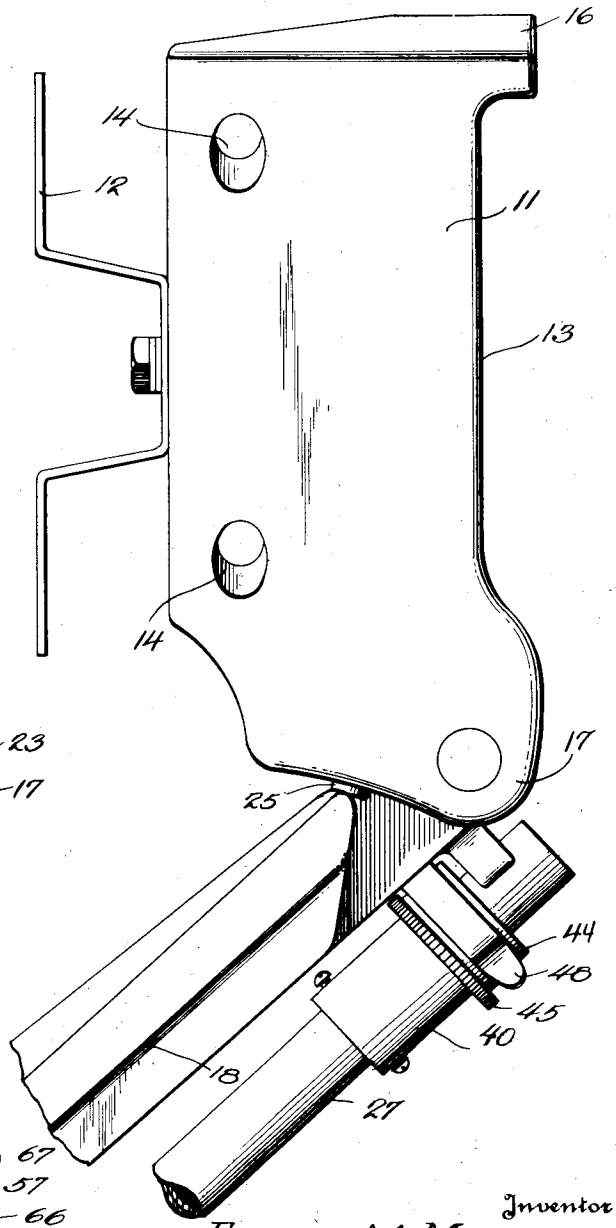
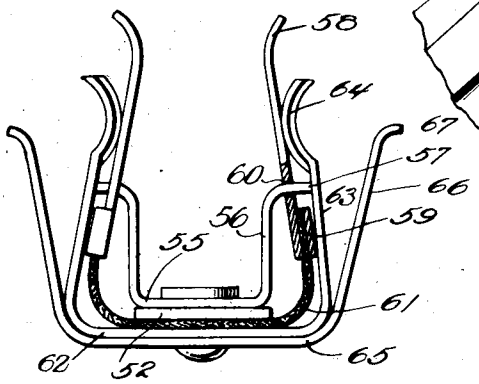


Fig. 9



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Fig. 3

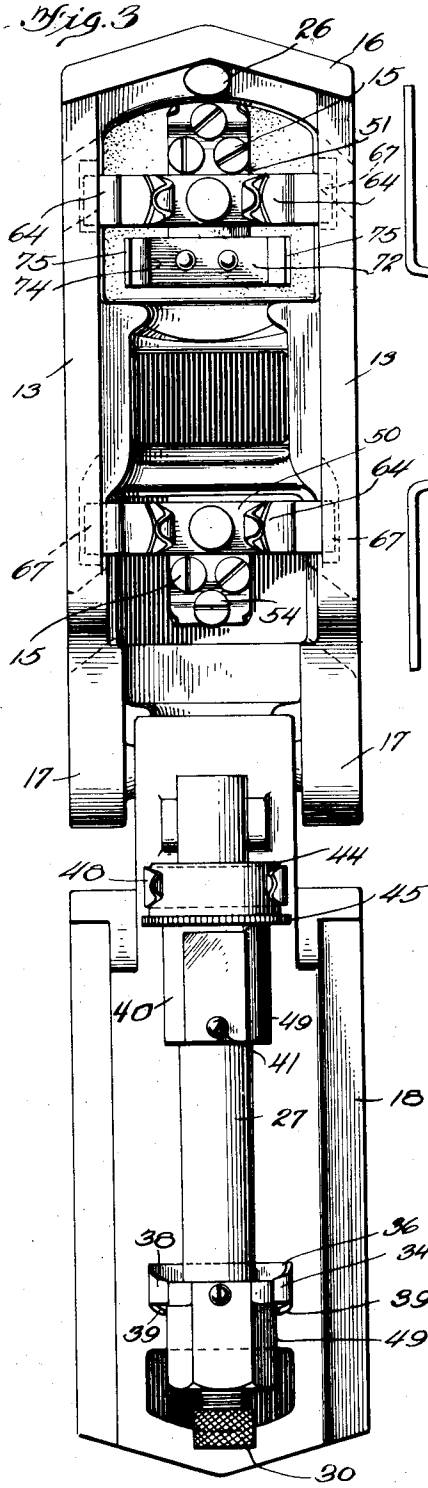


Fig. 4

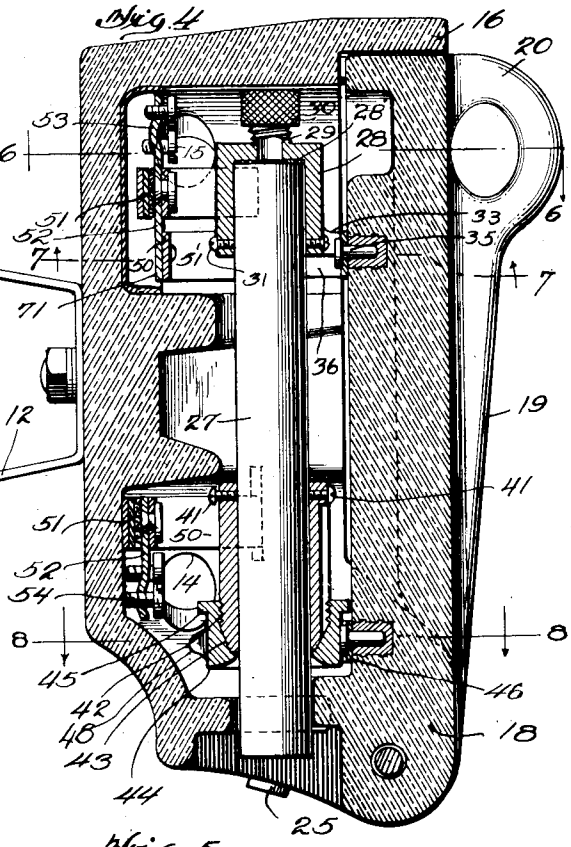
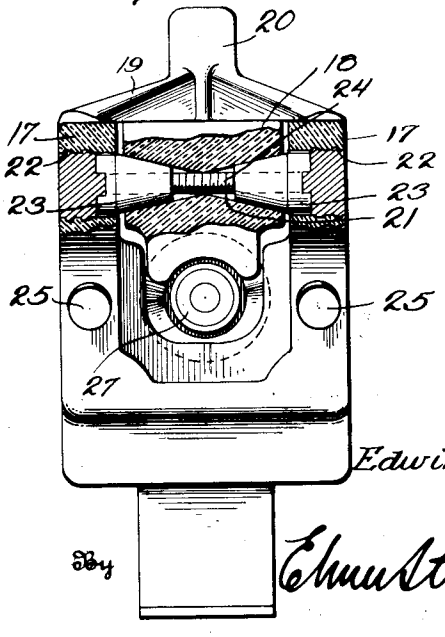


Fig. 5



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Fig. 6

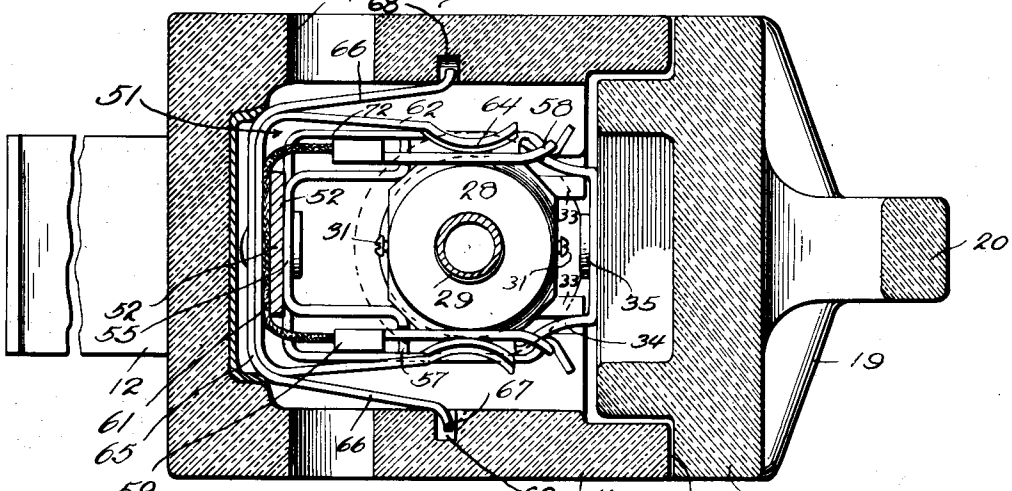


Fig. 7

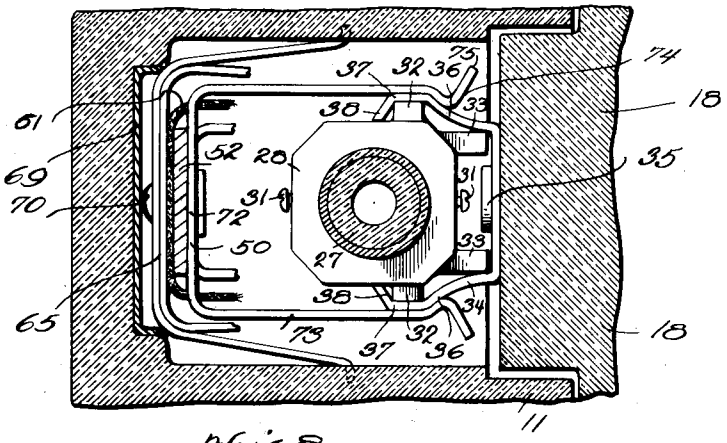
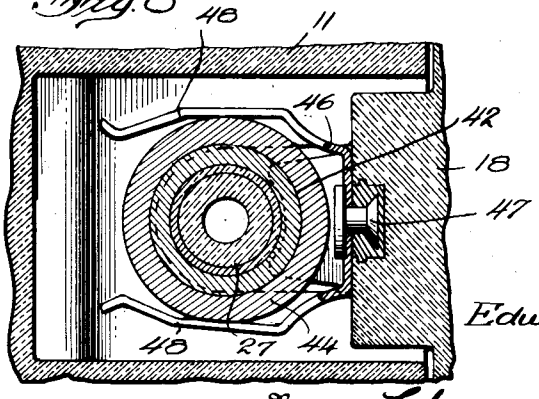


Fig. 8



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UNITED STATES PATENT OFFICE

2,011,543

TRANSFORMER CUT-OUT

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Application November 10, 1931, Serial No. 574,193

12 Claims. (Cl. 200—133)

This invention relates to novel improvements in transformer cut-outs generally and especially to those in which a fusible cut-out is replaceably mounted in an insulating housing. Devices of this type are intended to provide mountings for a fusible cut-out such as a generally cylindrical cartridge containing a fuse of wire of low melting point. Such cartridges must be assembled within a housing so that they will be adequately protected against the weather. This mounting, however, while it insures normal operation of the fuse under various weather conditions must be readily accessible for replacement of burned out fuses. It is, therefore, customary to mount such fuse cartridges in the cover of the housing, with contact members or circuit connections within the housing proper. Uniformity of operation requires that the contacts between the circuit terminals and the conducting parts of the fuse cartridge shall be relatively uniform. In other words, it is desirable to avoid the possibility of a faulty connection to the circuit where the fuse is applied, otherwise there is likelihood of irregular breaking down of resistance, arcing or pitting, accompanied by static disturbances which cause interference with the existing radio-frequent waves in the ether.

One of the objects of my invention is to provide a fuse cartridge of the usual cylindrical type with extended surfaces permitting a maximum contact with the terminals of the line conductors.

A further object of my invention is to improve the design of the terminals of the line conductor by providing them in the form of clips which shall be floating or self-aligning in order to adjust their position with respect to the contact surfaces on the fuse cartridge.

It is a further object of my invention to provide such contact clips of a freely floating type which will not be subject to any stress imposed by the rigid parts of the device where the clips are attached to the housing. By my particular design the conducting path for the electricity is provided separately from the support of the contact plates. An incidental advantage of this is that where the contact plates are held in contacting position by a resilient member such as a leaf spring, the latter is not a part of the electric circuit and is, therefore, not subject to overheating on the passage of heavy current. In this way the resilience of the spring is not apt to be impaired.

In addition, the improved design of clips permits the selection of metal for the spring elements of a type not found desirable where these elements must be relied on to carry electric current of relatively high voltage and large amperage. It is well recognized that some steels, such as chrome-nickel steel are admirably adapted for use as springs and are non-magnetic yet have the drawback of being of relatively high electrical resistance. Hence their use as current-carrying devices is undesirable. By my arrangement, springs of this and analogous materials can be used without introducing resistance in the electric circuit and without risk of depreciation from loss of resilience through heating. The electrical path is provided by current-carrying blades of copper or similar metal having low electrical resistance and high thermal conductivity.

By way of example and to disclose one form which my invention may take I have shown the preferred form in the following drawings in which,

Fig. 1 is a front elevation of the cut-out;

Fig. 2 is a side view of the same with the cover opened;

Fig. 3 is a front elevation with the cover opened;

Fig. 4 is a longitudinal section on line 4—4 of Fig. 1;

Fig. 5 is a lower end view partly in section;

Fig. 6 is an enlarged transverse section looking downward on line 6—6 of Fig. 4;

Fig. 7 is an enlarged transverse section looking upward on line 7—7 of Fig. 4;

Fig. 8 is an enlarged transverse section on line 8—8 of Fig. 4; and

Fig. 9 is a detail side elevation of a terminal clip.

The invention is embodied in a box or housing 11. This housing is of weather-proof insulating material and is customarily formed of glazed porcelain of which wet-process porcelain is an example, of the type well recognized as capable of withstanding the relatively high voltage common on electrical distribution lines. This housing is of the well known type which carries the customary metal bar 12 on its rear wall for attachment to a cross arm, pole or other adequate support. The side walls 13, 13 have apertures 14, 14 appropriately arranged near the rear wall for the convenient passage of the usual electric cables into the box. Inside the box these cables end in terminals of the usual type for attachment to screw-threaded binding posts 15, 15. The binding posts are held in the bases of the contact clips which will be later described in detail.

The upper ends of the walls 13, 13 are connected by an over-hanging top wall 16. The interior of the housing is appropriately partitioned

to suit the particular needs of this type of device when used with cartridge fuses.

The lower ends of the side walls 13, 13 are spaced to provide an open bottom. The front edges of the walls 13, 13 extend forwardly to form the projections 17, 17 which form holding means or bearings for the hinge of the cover.

The cover for the box is a separate piece of porcelain of the same type as the housing proper and is adapted to fit between the side walls and to be hinged within projections 17, 17. The cover 18 is adapted to fit in closing relation over the front faces of the side walls 13, 13 and beneath the over-hanging front edge of the top 16. The outer face of the cover 18 carries an appropriate rib 19 which is formed with an opening providing a ring handle 20 by which the cover may be swung around its hinge from open to closed position.

Since the cover 18 is made of material such as wet process porcelain, it is quite desirable that special means be provided for supporting it in the proper position centrally on the hinge member and for controlling the movement of the cover so that it will not strike the other parts of the housing and become chipped or otherwise damaged.

For this purpose I make use of a special form of frictional bearing. As shown in Fig. 5 the lower end of the cover 18 has conical recesses 21. Two aligned openings 22, 22 are provided in the ears 17, 17 of the side walls of the housing. These openings 22, 22 provide seats for conical bushings 23, 23, of thermo-plastic composition, aluminum or similar materials. These bushings taper inwardly toward the longitudinal axis of the housing and are screw-threaded. A screw 24 connects these bushings and serves to draw them together when either or both of the bushings are rotated. The bushings are rotated by means of a screw driver or other tool operating on the kerfed bases of the bushings.

The bushings are drawn up sufficiently close by means of the screw 24 to provide a frictional bearing on the inner walls of the communicating recesses 21, 21. In this way the bushings can be spaced in the recesses 22, 22 so that the cover is held in proper place between the side walls 13, 13 but out of contact with them.

The openings 22, 22 beyond the bases of the bushings are filled with cement or other material so as to hold the bushings and the cover in the desired position. In this way the bushings form a frictional hinge about which the cover may be swung but retain the cover in its adjusted position without risk of its falling against the housing and becoming damaged.

In order to limit the opening movement of the cover two rubber stops 25, 25 are provided on the open base of the housing. In like manner a rubber stop 26 is mounted on the housing beneath the over-hanging top 16 in order to help limit the closing movement of the cover as shown in Fig. 4.

The fuse is shown in detail in Fig. 4 to consist of a fiber tube 27 which contains the fusible wire. The upper ferrule 28 is in the form of a cap extending over the end of the tube 27 and fitted with an asbestos gasket 28'. The cap has a hollow neck 29 which is screw-threaded to receive the knurled cap cover 30.

The opposite or open end of the ferrule carries screws 31, 31 passing into recesses in the side walls of the tube 27.

The cap 28 is generally octagonal as shown in Fig. 7. On opposite sides of the cap are laterally extending lugs 32, 32 which are used to hold the cap in definite position with respect to the cover 18. The bottom wall of the cap 28 carries at its front end a pair of spaced parallel feet 33 which form stops for the cartridge when in its adjusted position. A holder 34 made of sheet brass is anchored by means of stud 35 to the inner wall of cover 18. This holder has opposed side arms 36 which are flared outwardly to form shoulders 37 and inwardly projecting ends 38, 38. The sides of the shoulders 37, 37 have extension lugs 39, 39 shown in Fig. 3 to extend inwardly to the side walls of the ferrule 28. In mounting the fuse on the cover 18 the cap ferrule 28 is placed with the feet 33, 33 against the base of the holder 34 thus bringing the arms 32, 32 within the shoulders 37, 37. The ferrule 28 is then pushed upward into the holder 34 until the arms 32, 32 are stopped by the lugs 39, 39. In this position the ferrule is held against further longitudinal movement by the lugs 39, 39 while the ends 38, 38 prevent the ferrule being pulled away from the cover.

Near the opposite end of the tube 27 there is mounted a ferrule 40. The upper and lower sides of this ferrule carry the screws 41, 41 by means of which the ferrule is locked into position on the tube.

The opposite end of the ferrule has screw-threaded portion 42 ending in a tapered end portion 43. A collar 44 is provided to thread on the portion 42 and fit against the tapered end portion 43. The collar has a knurled rim 45 at its upper end.

The means for holding the ferrule in place on the cover comprises a holder 46 which is anchored to the cover 18 by means of an embedded stud 47. Springs arms 48, 48 forming integral parts of the holder 46 extend inwardly from the cover and fit tightly around the collar 44 beyond the rim 45 in the manner shown in Fig. 8.

Both the ferrule 28 and ferrule 40 have opposite side walls 49, 49 which form bearing surfaces for the electrical conductors or clips mounted on the back wall of the housing.

In mounting the cartridge on the cover the ferrule 28 is inserted in holder 34 in the manner already described thus bringing the rim 45 between the two holders and the collar 44 opposite the holder 46. The cartridge is then pivoted on the holder 34 thus snapping the collar 44 between the spring arms 48, 48. The fuse is prevented from endwise motion in one direction by the fingers 39, 39 and by the rim 45 coming against the spring arms 48, 48 in the other direction. The feet 33, 33 and side arms 32, 32 hold the cartridge in such position that the side walls 49, 49 of the ferrules are maintained in parallel planes perpendicular to the inner wall of the cover.

The circuit connections for operating with the side walls 49 of the cartridge fuse ferrules are in the form of clip assemblies which are mounted against the back wall of the housing and locked into place between the side walls 13, 13. I have shown in Fig. 3 the lower circuit assembly denoted generally by the numeral 50 and the upper assembly 51. These assemblies are shown in enlarged side elevation in Figs. 6 and 7. Each of these assemblies include a terminal bar 52 which has one lateral extension with a transverse wire-receiving groove 53. The bar is screw-threaded on opposite sides of the groove to receive a series of binding screws 54 of which one is on the outer

end of the extension and two are spaced on the opposite side of the groove, all three having the heads thereof overlying the groove in order to fasten the end of the lead conductor in the groove. The conductor may thus be brought in through the apertures 14, 14 of either side wall 12, 13. The end of the conductor wire may be held in this groove or terminal members such as yokes may be formed for appropriate attachment to one of the binding screws 54.

The terminal bar 52 is in contact with a yoke 55. This yoke has parallel upstanding side members 56, each of which terminates in an outwardly extending tongue 57. The tongues 57 are reduced in width to about one-third of the width of the yoke 55. These tongues 57 form guides to support the contact plates by which the current is carried to the ferrules of the fuse. The shoulders between the members 56 and the tongues 57 also serve if desired, as abutments against which the ferrules 48 and 49 of the fuse may rest and limit the inward movement of the latter. This is well illustrated in Fig. 6.

Each tongue 57 supports a contact plate 58. The contact plate is generally flat with the upper end bent outwardly and is preferably formed of copper or analogous material of low electrical resistance and high thermal conductivity.

The lower end of the plate has lateral lugs 59 which are bent transversely over the plate to form a firm contact with the current-carrying means. The plate 58 is substantially of the same width as the yoke 55. The plate is transversely slotted at its mid portion above the lugs 59 to form a seat 60 resting upon the tongue 57 of the yoke 55. In this way the plate 58 is free to rock inwardly on the tongue 57 and yet be retained by the latter from displacement.

The lower ends of the plates 58, 58 are connected by a flexible conductor extending across beneath the terminal bar 52. This flexible conductor 61 is preferably formed of copper wires braided and woven into the form of a flexible web. The ends of the conductor 61 are held firmly between the plate 58 and its lugs 59. The mid-portion of the conductor is in extended contact with the bottom surface of the terminal bar 52.

A generally U-shaped spring 62 extends transversely beneath the terminal bar 52 and in contact with the web 61. The branches 63, 63 of the spring 62 terminate in inwardly extending bearing members 64, 64 which have a generally spherical contour thus forming a rocking bearing against the outer sides of the contact plates 58, 58. The inward movement of the branches 63, 63 is limited by the contact with the ends of the tongues 57, 57, as indicated in Fig. 9. When the ferrule of the fuse is received between the contact plates 58, 58 the latter are spread into parallelism and separate sufficiently to push the branches 63, 63 away from the ends of the tongues 57, 57 at the same time the ball contact between the bearing members 64 and contact plate 58 is such as to permit the latter to rock into extended contact with the side surface of the ferrule, without loss of pressure and yet with the minimum area of contact between the bearing members 64 and the plates 58. In this way the electrical path through the branches of the spring members 62 is reduced and substantially all the current carried through the flexible conductor 61.

A second U-shaped spring clip 65 is provided beneath the spring 62. The clip 65 has upstanding arms 66, 66 terminating in outwardly bent fingers 67, 67. The fingers are adapted to be sprung into the opposite grooves 68, 68 in the inner side walls of the housing, as shown in Fig. 6.

When the clips are thus received within the housing the lower corners fit within a cushioning piece of sheet insulation 69 held in the base of the housing.

The terminal bar 52 is attached on one side to the yoke 55 and on the opposite side to the conductor 64, the spring 62 and the spring clip 65 by means of a rivet 70 so that the device may be assembled for insertion into the housing as a unit.

The upper assembly has a second lateral extension on the terminal bar on the side of the yoke 55 opposite from the extension carrying the binding screws 54. The extension 71 (Fig. 4) serves as a support for a fairly U-shaped lock 72, the arms 73 of which are bent inwardly to form a rib 74 and then outwardly to form flaring flanges 75. This structure is illustrated in detail in Fig. 7 where it is apparent that the cover 18 in closed position brings the holder 34 with its shoulders 37 inside the ribs 74.

In the closing operation of the cover the inwardly projecting ends 38 of the holder strike the flaring flanges 75 and spread the lock to permit the shoulders 37 to pass by the ribs 74. The arms 73 then spring inwardly to bring the ribs 74 against the side arms 36 of the holder thus locking the cover 18 and its associated parts in operative position.

It is to be understood that during this operation the contact plates 58 have been caused to conform to the side walls of the ferrules in the manner above described and as illustrated in Fig. 6.

In the assembly of this device the cover 18 is accurately positioned between the walls 12, 13 by means of the improved hinge so that the holders or the cartridge fuse are opposite the contact or terminal members in the base.

The terminal assemblies are inserted in the base and locked in place by means of the fingers 67.

The fuse is inserted first in the upper holder and then in the lower holder in the manner already described so that it is accurately positioned with respect to the cover and the terminal members.

After a line conductor has been applied to each of the terminal members the operation of closing the cover serves to bring the contact plates 58 in extended conducting contact with the side walls of the fuse ferrules. In this operation the contact plates are held up into proper position by the resilience of the springs and with a minimum area of pressure as is most desirable.

The cut-out is held in closed or operating position by means of the spring lock 72 fitting around holder 34.

The electrical path is primarily through the contact plates 58 and the flexible web 61 so that excessive current will not impair the resilience of the springs 62 or the holding property of the yoke 55.

While I have shown the preferred form of my invention for purposes of example, yet it is evident that the features of this invention are not limited to this form but may be embodied in devices of various forms and proportions within the scope of the appended claims.

What I claim is:

1. In combination, a housing for a cut-out or the like, said housing having parallel side walls, a cover for said housing, and a cover-centering pivot carried by said walls for holding the cover in predetermined spaced relation between said side walls.

2. In combination, a housing for a cut-out or the like, said housing having parallel side walls, a cover for said housing, and a pivot carried by said walls and comprising means for axially adjusting and holding the cover in predetermined spaced relation between said walls.

3. In combination, a housing for a cut-out or the like, said housing having parallel side walls, a cover for said housing, and a frictional pivot carried by said walls for holding the cover against free motion.

4. In combination, a housing, a cover hinged thereto, spaced holders on the inner surface of the cover, one of said holders having retaining means, the other holder having a pair of opposed spring arms, a fuse, a ferrule on the fuse having means fitting within the retaining means of the first mentioned holder to limit the movement of the fuse in one longitudinal direction, a second ferrule on the fuse having a circular flanged collar engaging the second mentioned holder to prevent movement of the fuse in the opposite longitudinal direction and circuit terminal members carried by the housing for engagement with said fuse when the cover is closed.

5. In combination, a housing, a cover hinged thereto, spaced holders on the inner surface of the cover, one of said holders having retaining means, a fuse, a ferrule with opposite plane sides on the fuse, and having means fitting within the retaining means of said holder, separate means on the ferrule spacing the ferrule from the cover with the plane sides perpendicular to the inner surface of the cover, the other holder having a pair of opposed spring arms, a second ferrule on the fuse engaging said spring arms, and circuit terminal members carried by the housing for engagement with the ferrules of the fuse when the cover is closed.

6. In combination, a housing, a cover hinged thereto, spaced holders on the inner surface of the cover, a fuse carried by said holders, circuit terminal members anchored in the housing for engagement with said fuse when the cover is closed, each of said members comprising a supporting yoke, outwardly extending tongues on the yoke, contact plates supported on said tongues, independent resilient means including part-spherical bearing members in contact with said plates and limited in movement by the said yoke tongues, and a common conductor for said contact plates.

7. In combination, a housing, a cover hinged thereto, spaced holders on the inner surface of the cover, a fuse carried by said holders, circuit terminal members anchored in the housing for engagement with said fuse when the cover is closed, each of said members comprising a supporting yoke outwardly extending tongues on the yoke, contact plates supported on said tongues, independent resilient means in contact with said plates, a common conductor for said plates, a terminal bar, means for anchoring the terminal member in the housing and means fastening the yoke, resilient means, conductor and anchoring means to the terminal bar.

8. A terminal member for a circuit cut-out comprising a terminal bar, a yoke mounted thereon, a contact plate supported loosely on each end of the yoke, a common flexible conductor connecting the plates to the terminal bar, and a U-shaped spring resting on the contact plates beyond their attachment to the yoke.

9. A terminal member for a circuit cut-out comprising a terminal bar, a yoke mounted thereon, a contact plate supported loosely on each end of the yoke, a common flexible conductor connecting the plates to the terminal bar, and a U-shaped spring having part-spherical bearing members resting on the contact plates beyond their attachment to the yoke.

10. A terminal member for a circuit cut-out comprising a terminal bar, a yoke mounted thereon, a contact plate supported loosely on each end of the yoke, a common flexible conductor connecting the plates to the terminal bar, and a U-shaped spring of relatively lower conductivity than the plates and conductor, said spring bearing on the plates with a minimum area of contact and beyond the points of their attachment to the yoke.

11. A terminal member for a circuit cut-out comprising a terminal bar, a yoke mounted thereon, a contact plate supported loosely on each end of the yoke, a common flexible conductor connecting the plates to the terminal bar, a U-shaped spring bearing on the contact plates, anchoring means, and a rivet fastening the yoke, conductor spring and anchoring means to the terminal bar.

12. A terminal member for a circuit cut-out comprising a terminal bar, a yoke mounted thereon, outwardly extending tongues on the ends of the yoke, a contact plate supported loosely on each tongue, a common flexible conductor connecting the plates to the terminal bar, a U-shaped spring bearing on the contact plates beyond their attachment to the yoke, the said tongues serving to limit the inward movement of the spring and common means for fastening the yoke, conductor and spring to the terminal bar.

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