May 8, 1951 P. V. QUICK 2,552,015

DROP-OUT FUSE HOLDER HANDLING APPARATUS

Filed June 13, 1950 4 Sheets-Sheet 1

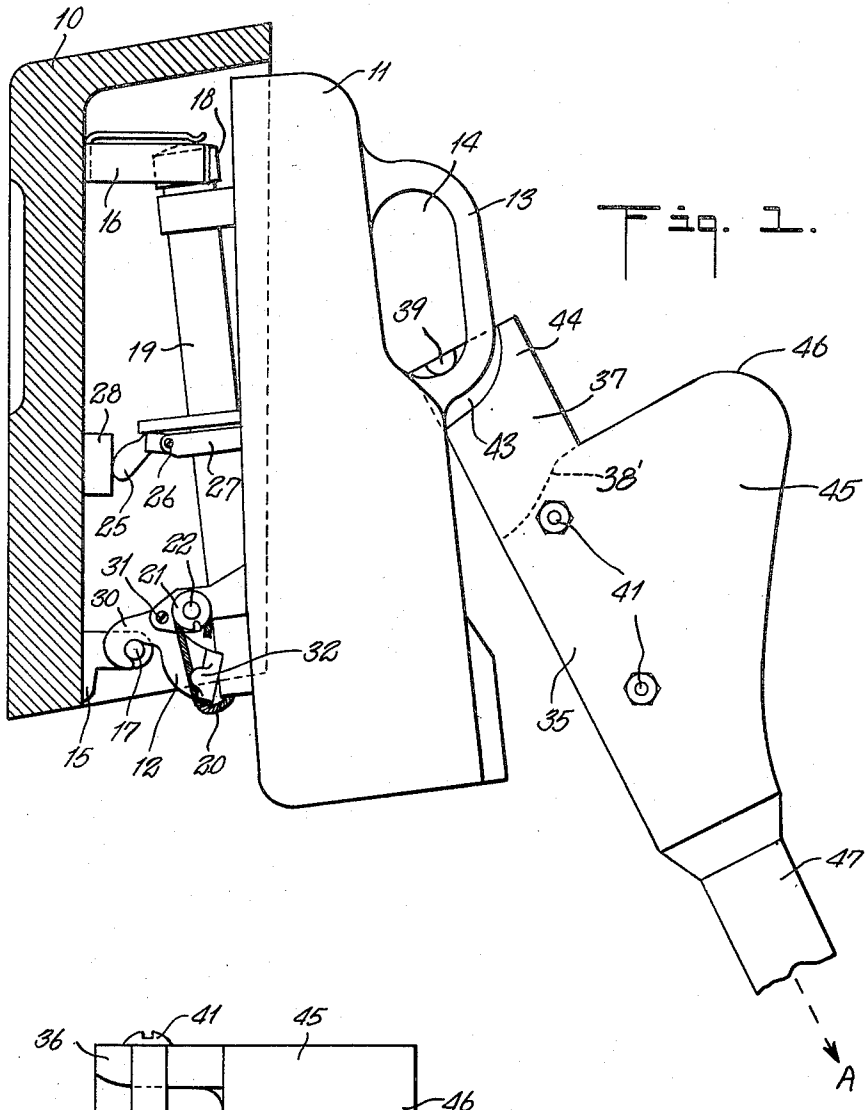


Fig. 1.

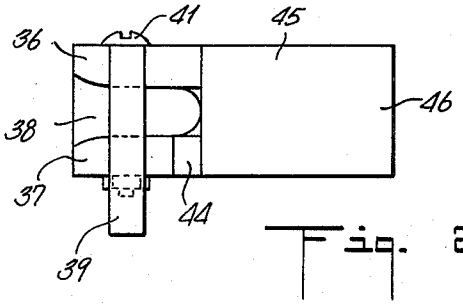


Fig. 2.

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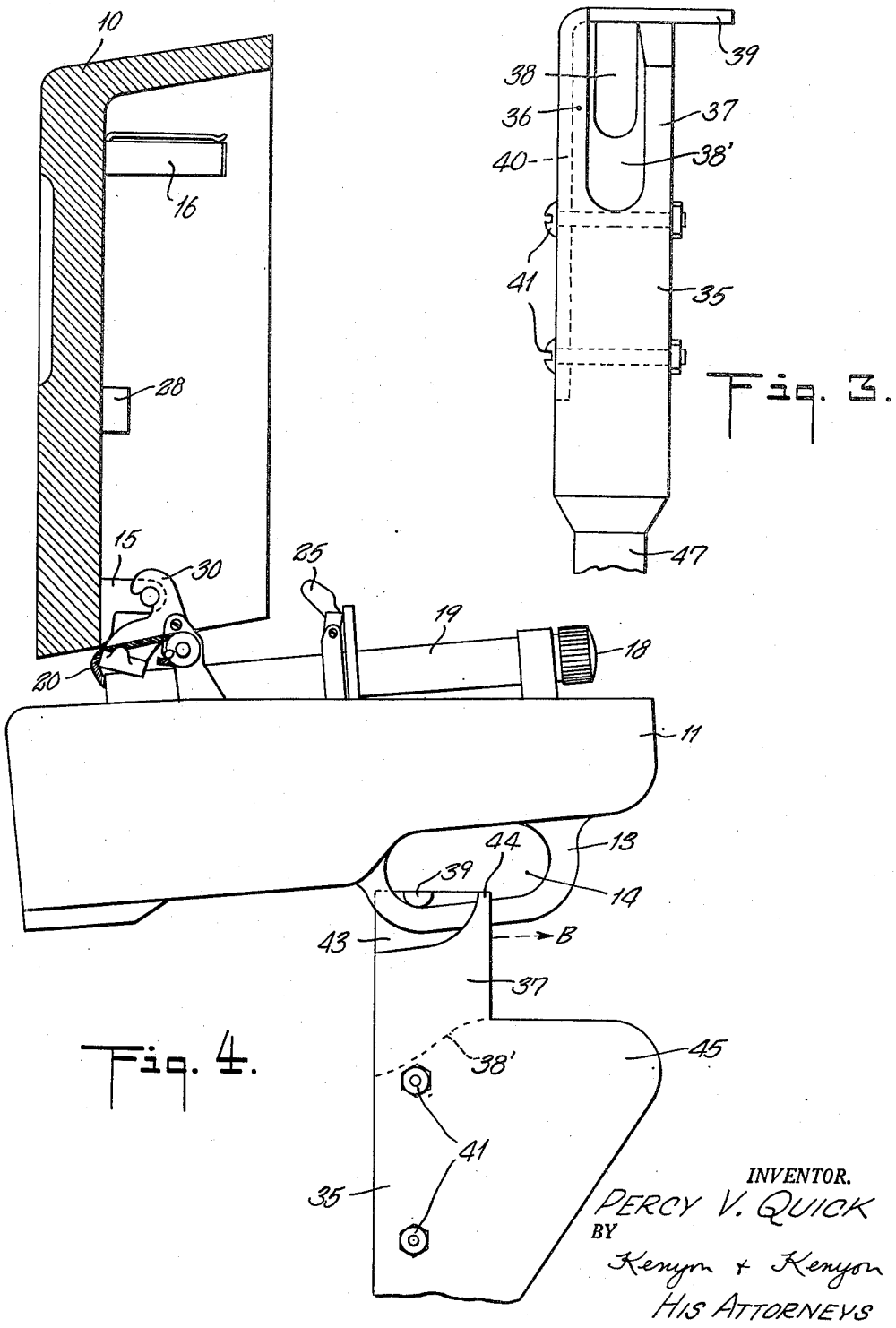


Fig. 3.

Fig. 4.

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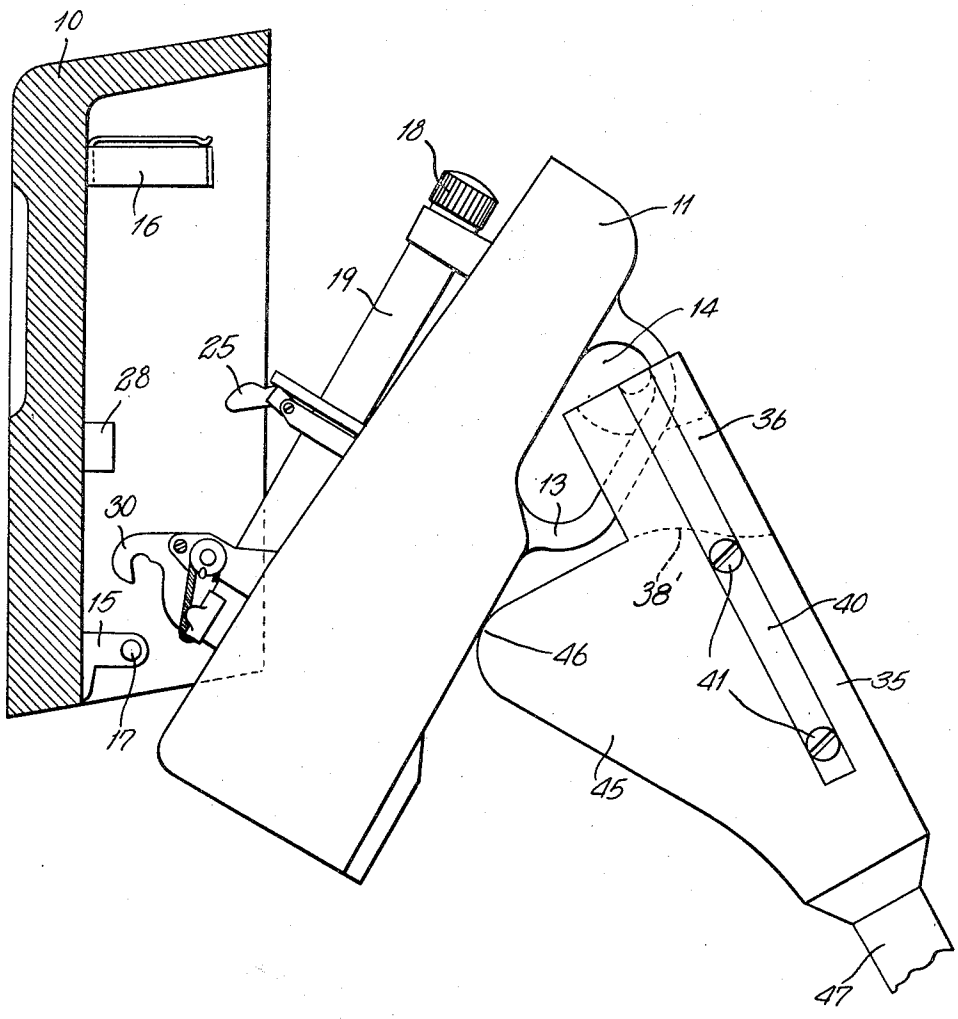


Fig. 5.

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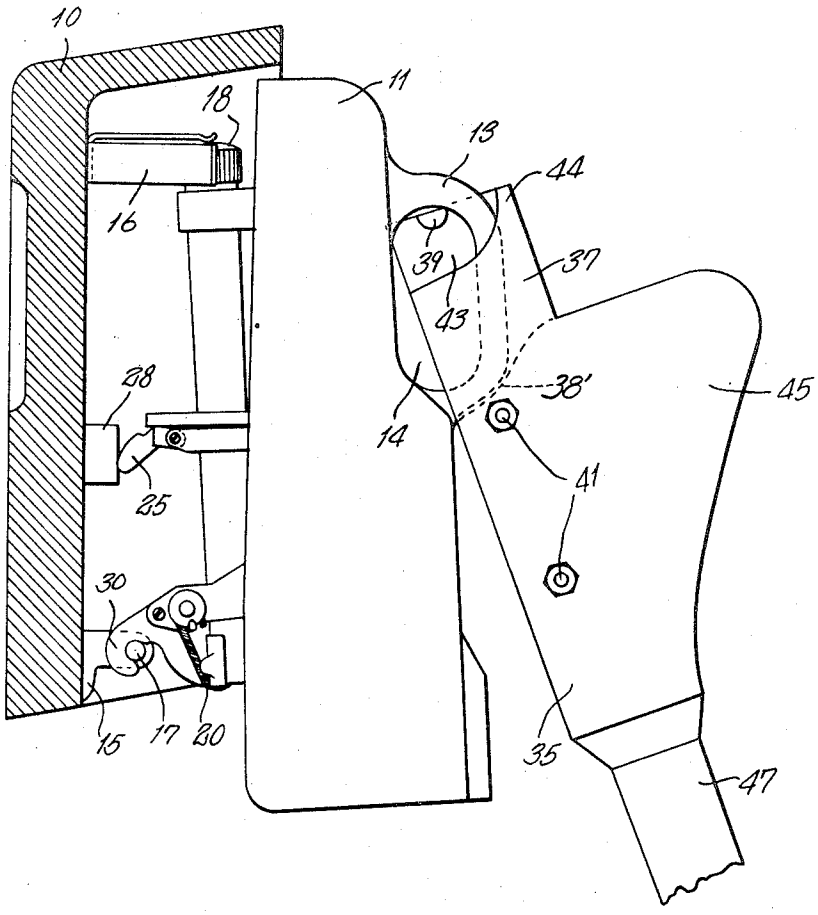


Fig. 6.

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DROP-OUT FUSE HOLDER HANDLING APPARATUS

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7 Claims. (Cl. 294—19)

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My invention relates to handling apparatus for removing and replacing fuse holders of the drop-out type.

The cutouts bearing these fuse holders are frequently placed on the cross arms of utility poles high above the ground, thus raising a problem of maintenance when the fuse element therein burns out. In the usual form or type of cutout the fuse holder is disposed in a substantially vertical position when the circuit is closed, with the fuse element bridging a pair of terminals carried by a housing member to which the holder is pivotally hinged. Conventionally, in this form of cutout the fuse holder is pivoted at its lower end to the housing member and secured in a spring clip at its upper end, and is arranged to move the fuse holder out of its normal circuit-closing position when the fuse element is burned out to a position observable from a distance to indicate that replacement of the fuse element is necessary. The hinge and pivot arrangement are constructed such that the fuse holder can thereafter be pivoted to a drop-out position and then bodily lifted from the pivot borne by the housing member. A handle extending outwardly from the face of the fuse holder is conventionally provided, with the central gripping portion of the handle being longer than either outwardly extending end portion in order that one may insert several fingers in the aperture provided by the handle if the fuse holder is to be removed and replaced manually.

One object of my invention is to provide an improved handling apparatus for use by the utility repairman in removing and replacing fuse holders from cutouts of the general type described, which handling apparatus can conveniently and easily be used by the maintenance man standing on the ground to thus remove and replace fuse holders of cutouts located on the cross arms of utility poles.

Another object of my invention is to provide such a handling apparatus which has no moving parts yet which provides a positive arrangement for firmly grasping the handle of the fuse holder during the operation of the apparatus.

Another object of my invention is to provide such a handling apparatus which can be easily fabricated at low cost.

Other and further objects of my invention will be apparent from the following description when taken with the accompanying drawings, in which:

Fig. 1 shows my handling apparatus in position to engage the handle of the fuse holder of an indicating enclosed-type cutout in which the fuse element has burned out;

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Figs. 2 and 3 are top or end and side views, respectively, of my handling apparatus shown in Fig. 1;

Fig. 4 illustrates the relative positions of my handling apparatus and the fuse holder when the latter is moved to its drop-out position;

Fig. 5 shows my handling apparatus in position for removal of the fuse holder thereafter from the housing member of the cutout with the fuse holder just lifted off its pivot; and

Fig. 6 illustrates my handling apparatus in its position for replacing the fuse holder in the housing member of the cutout after the fuse element has been replaced and the fuse holder replaced on the pivot.

Referring now to the figures, and particularly to Fig. 1, I have illustrated my handling apparatus being used for removal and replacement of the fuse holder of the indicating enclosed-type cutout of the type generally described above. Since the cutout itself is well known and forms no part of my invention, its construction and operation will be described only in sufficient detail to demonstrate the manner in which my fuse holder functions therewith.

As shown in Fig. 1, the cutout consists generally of a box-like housing member 10 open at its front and lower end and which is cut away on a sectional line in order to illustrate the inner mechanism of the housing member. While not shown, the cutout is secured by any suitable means to the cross arm of a utility pole or other desired support in its vertical position illustrated. Fuse holder 11 constitutes the cover for the cutout and is hinged by toggle mechanism 12 to the housing member 10. Handle 13 is provided for fuse holder 11 adjacent the upper end thereof and extends outwardly from its face. Note that the central straight gripping portion of the handle is longer than either outwardly-extending end portion so that the aperture 14 in the handle is large enough to admit several fingers when the fuse holder 11 is to be removed manually from housing member 10 of the cutout.

Two contacts 15 and 16 are provided within and carried by the housing member 10, lower contact 15 bearing a pintle 17 cooperating with toggle mechanism 12 and upper contact 16 being in the form of a spring clip which is adapted to removably embrace a metallic thimble 18 affixed at one end of fuse tube 19, which is secured within fuse holder 11 as shown. The fuse element 20 is contained within fuse tube 19, being secured

at one end thereof by means of thimble 18 and extending from the lower end of tube 19 as shown and then wrapped around toggle mechanism 12 and secured under threaded washer 21, which is tightened in place by means of thumb screw 22.

Dog 25 is carried on pivot 26 borne by supporting member 27 of fuse holder 11 and constantly urged in a clockwise direction by means of a spring (not shown) against projection 28 extending from the back of housing member 10. Toggle mechanism 12 includes a hook-shaped eye 30 pivoted on pivot 31 to the support extending from fuse holder 11 and includes an ear 32 adapted to engage the lower end of fuse tube 19 when fuse element 20 is secured in its current-carrying position, as shown in Fig. 6. In Fig. 1 has been illustrated the condition when the fuse is blown, and thus the clockwise urging of dog 25 due to the biasing spring (not shown) against projection 28 has caused toggle mechanism 12 to pivot about pivot 31 as well as about pintle 17, moving ear 32 generally out of engagement with fuse tube 19 to the position shown. Fuse holder 11 is thus pivoted outwardly about upper contact clip 16 to the position shown in Fig. 1, thereby indicating to an observer that the fuse has been blown and needs replacement.

My handling apparatus is utilized for removing the fuse holder 11 from the housing member 10 for this purpose. As best seen from Figs. 2 and 3, my handling apparatus is in the shape of a bifurcated member 35 whose bifurcations 36 and 37 have extended opposed surfaces and define a passage 38 therebetween. Since handle 13 is conventionally provided with a rounded surface, the inner opposed surfaces of bifurcations 36 and 37 forming the boundaries of passages 38 are generally rounded as shown at 38' (see also Fig. 6) to receive this rounded surface of handle 13 and engage it snugly. A stud 39, which may be of half-round shape as shown, extends normally from and with its flat tangentially of the extremity of bifurcations 36 toward and beyond the other bifurcation 37 as shown in Figs. 2 and 3, thus overlying both the passage 38 and the extremity of bifurcation 37, which is formed to provide a channel between its surface underlying stud 39 and the latter, as described more in detail hereinafter. Stud 39 in the form of handling apparatus, shown constitutes one arm of L-shaped member 40, the other arm of which fits in a recess provided in the outer surface of bifurcation 36 and extending longitudinally of bifurcated member 35, as best seen in Fig. 5. Member 40 is maintained in place by suitable means such as bolt and nut connections 41. The maximum width of stud 39 is made less than the minimum dimension, i. e., the width, of aperture 14 of handle 13 and preferably is made even smaller as shown.

Bifurcation 37 has a portion of its extremity adjacent half-round stud 39 cut away as mentioned above to form a channel 43 allowing the passage therebetween of an end portion of handle 13 of fuse holder 11 in certain relative positions of the latter and my handling apparatus. The extremity of bifurcation 37 is thus shaped as shown with a tip portion 44 extending to the tangential plane defined by the extremity of bifurcation 36 and the flat or half-round stud 39. Member 35 is also formed with a supporting arm 45 of generally wedge-like shape extending on the opposite side of tip portion 44 from stud 39 and having a planar portion or surface 46 generally parallel to the latter. Pole 47 is secured to and extends from the lower end of bifurcated member 35 and is preferably of short extent so that my apparatus may be conveniently used by a lineman working aloft on a utility pole. A suitable extension or extensions of pole 47 are, of course, also provided of suitable length as necessary for reaching the cutout on the cross arm of the utility pole from the ground.

As shown in Fig. 1, the first step in utilizing my handling apparatus to remove fuse holder 11 from housing member 10 is to insert stud 39 through aperture 14 of handle 13 adjacent the lower end portion of the handle from the right side of the cutout, looking at the front thereof, with the pole 47 and hence the longitudinal axis of bifurcated member 35 held generally parallel to the longitudinal axis of fuse holder 11 and of the extended central gripping portion of handle 13 of the latter. The exact degree of parallelism required may be varied by proper shaping of the extremity of bifurcation 37 so as to provide channel 43, to allow the passage of the lower end portion of handle 13 therethrough, when my handling apparatus is maintained either parallel or at a predetermined acute angle relative to the longitudinal axis of fuse holder 11.

For any relative acute angle between the longitudinal axis of bifurcated member 35 and fuse holder 11 less than this maximum predetermined angle, the lower end portion of handle 13 will pass through channel 43 to a position where handle 13 abuts the inner surface of bifurcation 36. This is the position in which my handling apparatus is shown relative to the handle 13 of fuse holder 11 in Fig. 1. Downward movement of my handling apparatus in the direction of arrow A pulls thimble 18 out of spring clip 16 and rotates fuse holder 11 on pintle 17 down to the drop-out position, illustrated in Fig. 4. Note that as fuse holder 11 begins to pivot on pintle 17, the inner surface of tip portion 44 of bifurcation 37 begins to engage one side of the central gripping portion of handle 13, and the opposed inner surface of bifurcation 36 begins to engage the other side of the central gripping portion of handle 13. Thus handle 13 is firmly secured to my handling apparatus because of the central portion of handle 13 being gripped by opposed inner surfaces of bifurcations 36 and 37 and the action of stud 39 in preventing withdrawal of the handle 13 from passage 38 between bifurcations 36 and 37. This is readily apparent from the showing of Fig. 4.

My handling apparatus is next removed from handle 13 by moving it in a direction generally parallel to the central gripping portion of handle 13 along the line marked B until half-round stud 39 abuts against the other or upper end portion of handle 13, whereupon the handling apparatus may be withdrawn from the handle 13 in the drop-out position of fuse holder 11 inasmuch as channel 43 in this position now allows the passage therethrough of the upper end portion of handle 13.

My handling apparatus is next rotated 180 degrees about its longitudinal axis and stud 39 again inserted in aperture 14 adjacent the lower end portion of the handle but this time from the left side of the fuse holder 11, viewing it from the front. Bodily upward movement of the handling apparatus thereupon causes contact between surface 46 of arm 45 and the front surface of fuse holder 11 as shown in Fig. 5. Slight lateral movement of the lower end of pole 47 to position the latter in the angular position from the vertical

shown in Fig. 5 causes counter-clockwise rotation of fuse holder 11 about pintle 17, whereupon further bodily upward movement of the pole 47, and hence of my handling apparatus, causes hook-member 30 to be lifted off pintle 17 to the position shown in Fig. 5, whereupon fuse holder 11 may be lowered to the ground for replacement of fuse element 20. Note that in the position of my handling apparatus shown in Fig. 5, opposed inner surfaces of bifurcations 36 and 37 are again provided engaging opposite sides of the central gripping portion of handle 13.

After the fuse element 20 has been replaced, fuse holder 11 is again raised to the position shown in Fig. 5, whereupon bodily downward movement of fuse holder 11 and my handling apparatus causes hook member 30 to engage pintle 17. Further bodily downward movement of pole 47 and hence of my handling apparatus will return fuse holder 11 to its drop-out position shown in Fig. 4, with the longitudinal axis of my handling apparatus generally perpendicular to the longitudinal axis of fuse holder 11. Half-round stud 39 may then be slid along the central gripping portion of handle 13 until it abuts the lower end of the latter, whereupon the handling apparatus may be removed from the fuse holder handle 13 in much the same manner that it was removed from the upper end portion thereof at the end of the operation described above in connection with Fig. 4.

My handling apparatus is next again rotated 180 degrees about its longitudinal axis to its original position and stud 39 then inserted through aperture 14 adjacent the upper end portion of handle 13 and from the right side of the fuse holder 11, viewing it from the front. Bodily upward movement of pole 47 then pivots fuse holder 11 about pintle 17 to the position shown in Fig. 6, whereupon further upward movement of pole 47 causes thimble 18 to seat firmly in spring clip 16, completing the replacement of fuse holder 11 in housing member 10 of the cutout. Again, in this position of my handling apparatus, the central gripping portion of handle 13 has its opposite sides engaged by opposed inner surfaces of bifurcations 36 and 37.

Bodily generally downward movement of pole 47 from the position shown in Fig. 6 thereafter places stud 39 of my handling apparatus abutting the inner surface of the lower end portion of handle 13, and in the relative position therewith shown in Fig. 1. Stud 39 may then be withdrawn from aperture 14 because of the free passage for the lower end portion of handle 13 provided by channel 43.

It will thus be observed that I have provided handling apparatus without any moving parts which nevertheless provides a positive gripping action of the fuse holder handle during operation to prevent accidental dropping thereof while it is being removed or replaced.

Preferably, I fabricate my handling apparatus of insulating material such as, for example, oak wood, and make half-round stud 39 of suitable structurally rigid material as, for example, steel. It will be obvious, of course, that, providing handle 47 is made of insulating material, member 35 may be made of metal if desired, whereupon stud 39 and member 35 could be fabricated integrally of metal.

In addition, while stud 39 has been shown as overlying the extremity of bifurcation 37 and extending therebeyond in order to make the operation of my handling apparatus in engaging the handle 13 more facile, to insure the desired operation it is, of course, only necessary that stud 39 project slightly from the inner surface of bifurcation 36 into the passage 38, in order to prevent the withdrawal of handle 13 from passage 38 when opposite sides of the central gripping portion of the handle are engaged by opposed surfaces of bifurcations 36 and 37.

While I have described a particular embodiment of my invention as required, the principles of my invention are of broader application in ways which will be apparent to those skilled in the art.

The scope of my invention is defined in the following claims.

What I claim is:

1. Handling apparatus for use with drop-out fuse holders of fuse cutouts of the type in which the fuse holder includes an outwardly-extending apertured handle having end portions joined by a central gripping portion of greater length, said apparatus comprising a bifurcated member with the bifurcations thereof having extended opposed surfaces and a handle-engaging member, for passage through the aperture of said fuse holder handle and of a width no greater than the minimum dimension of said aperture, extending from the extremity of one bifurcation toward the other, said other bifurcation being shaped adjacent said handle-engaging member to provide a channel allowing the passage of one end portion of said handle therethrough, when said holder in a plane generally parallel to the longitudinal axis of said bifurcated member, to a position surrounding said handle-engaging member and engaging the inner extended surface of the first-mentioned bifurcation, and both bifurcations including opposed portions of said extended opposed surfaces for engaging opposite sides of the central gripping portion of said handle when the apparatus is pivoted on said handle-engaging member about said handle.

2. Handling apparatus for use with drop-out fuse holders of fuse cutouts of the type in which the fuse holder is pivoted at its lower end to the cutout and may be rotated in one direction to a drop-out position from which it may be removed from the cutout by thereafter rotating it slightly in the opposite direction and then lifting it off its pivot and the fuse holder includes an outwardly-extending apertured handle having end portions joined by a central gripping portion of greater length, said apparatus comprising: a bifurcated member with the bifurcations thereof having extended opposed surfaces; a handle-engaging member, for passage through the aperture of said fuse holder handle and of a width no greater than the minimum dimension of said aperture, extending from the extremity of one bifurcation toward the other; said other bifurcation being shaped adjacent said handle-engaging member to provide a channel allowing the passage of one end portion of said handle therethrough, when said holder lies in a plane generally parallel or perpendicular to the longitudinal axis of said bifurcated member, to a position surrounding said handle-engaging member and engaging the inner extended surface of the first-mentioned bifurcation, and both bifurcations including opposed portions of said extended opposed surfaces for engaging opposite sides of the central gripping portion of said handle when the apparatus is pivoted thereafter on said han-

dle-engaging member about said handle and toward the central portion thereof; and a fuse holder supporting arm extending from said bifurcated member at a point removed from said bifurcations and on the opposite side of said opposed portions from said handle-engaging member and having a supporting surface extending generally parallel to the latter.

3. Handling apparatus for use with drop-out fuse holders of fuse cutouts of the type in which the fuse holder includes an outwardly-extending apertured handle having end portions joined by a central gripping portion of greater length, said apparatus comprising a bifurcated member with the bifurcations thereof having extended opposed surfaces and a handle-engaging member, for passage through the aperture of said fuse holder handle and of a width no greater than the minimum dimension of said aperture, extending from the extremity of one bifurcation toward and beyond the other bifurcation and overlying the latter, said other bifurcation being shaped adjacent said handle-engaging member to provide a channel allowing the passage of one end portion of said handle therethrough, when said holder lies in a plane generally parallel or perpendicular to the longitudinal axis of said bifurcated member, to a position surrounding said handle-engaging member and engaging the inner extended surface of the first-mentioned bifurcation, and both bifurcations including opposed portions of said extended opposed surfaces for engaging opposite sides of the central gripping portion of said handle when the apparatus is thereafter pivoted on said handle-engaging member about said handle and toward the central portion thereof.

4. Handling apparatus for use with drop-out fuse holders of fuse cutouts of the type in which the fuse holder is pivoted at its lower end to the cutout and may be rotated in one direction to a drop-out position from which it may be removed from the cutout by thereafter rotating it slightly in the opposite direction and then lifting it off its pivot and the fuse holder includes an outwardly-extending apertured handle having end portions joined by a central gripping portion of greater length, said apparatus comprising: means to pivotally engage, in drop-out position, the end portion of said handle adjacent the supported end of the fuse holder; fixed restraining means disposed adjacent said first-mentioned means and positioned to engage the central gripping portion of said handle as said first-mentioned means is then slid longitudinally along said handle to engage the other end portion thereof and to prevent thereafter movement of the handle longitudinally of said first-mentioned means; and means disposed on the other side of said first-mentioned means from said restraining means to engage and support said fuse holder intermediate its handle and its supported end while the handle is locked to said first-mentioned means and pivoted at its said other end portion thereabout, whereby the fuse holder may be given bodily upward movement as said first-mentioned means is thereafter raised, thereby to lift the supported end of the fuse holder off its support.

5. Handling apparatus for use with drop-out fuse holders of fuse cutouts of the type in which the fuse holder is pivoted at its lower end to the cutout and may be rotated from its operative position to a drop-out position and the fuse holder includes an outwardly-extending apertured handle having end portions joined by a central gripping portion of greater length, said apparatus comprising: means to pivotally engage the handle of the fuse holder in its operative position; and fixed restraining means disposed adjacent said first-mentioned means and positioned to engage the central gripping portion of said handle as said handle is pivoted about said first-mentioned means when rotated from its operative position to its drop-out position and to prevent thereafter movement of the handle longitudinally of the latter.

6. Handling apparatus for use with drop-out fuse holders of fuse cutouts of the type in which the fuse holder is pivoted at its lower end to the cutout and may be rotated in one direction to a drop-out position from which it may be removed from the cutout by thereafter rotating it slightly in the opposite direction and then lifting it off its pivot and the fuse holder includes an outwardly-extending apertured handle having end portions joined by a central gripping portion of greater length, said apparatus comprising: a bifurcated member with the bifurcations thereof having extended opposed surfaces and of such length that the dimension of the passage therebetween longitudinally of said member is equal to the maximum dimension of the aperture of said fuse holder handle plus the cross-sectional dimension of an end portion of said handle; and a stud, for passage through the aperture of said fuse holder handle and of a width no greater than the minimum dimension of said aperture, extending normally from and tangentially of the extremity of one bifurcation toward and beyond the other bifurcation and overlying the latter; said latter bifurcation being shaped adjacent said stud to provide a channel allowing the passage of one end portion of said handle therethrough, when said holder lies in a plane generally parallel or perpendicular to the longitudinal axis of said member, to a position surrounding said stud and engaging the inner extended surface of the first-mentioned bifurcation, and both bifurcations including opposed portions of said extended opposed surfaces for engaging opposite sides of the central gripping portion of said handle when the apparatus is thereafter pivoted on said stud about said handle and toward the central portion thereof.

7. Handling apparatus for use with drop-out fuse holders of fuse cutouts of the type in which the fuse holder is pivoted at its lower end to the cutout and may be rotated in one direction to a drop-out position from which it may be removed from the cutout by thereafter rotating it slightly in the opposite direction and then lifting it off its pivot and the fuse holder includes an outwardly-extending apertured handle having end portions joined by a central gripping portion of greater length, said apparatus comprising: a bifurcated member with the bifurcations thereof having extended opposed surfaces and of such length that the dimension of the passage therebetween longitudinally of said member is equal to the maximum dimension of the aperture of said fuse holder handle plus the cross-sectional dimension of an end portion of said handle; a stud, for passage through the aperture of said fuse holder handle and of a width no greater than the minimum dimension of said aperture, extending normally from and tangentially of the extremity

of one bifurcation toward and beyond the other bifurcation and overlying the latter; said latter bifurcation being shaped adjacent said stud to provide a channel allowing the passage of one end portion of said handle therethrough, when said holder lies in a plane generally parallel or perpendicular to the longitudinal axis of said member, to a position surrounding said stud and engaging the inner extended surface of the first-mentioned bifurcation, and both bifurcations including opposed portions of said extended opposed surfaces for engaging opposite sides of the central gripping portion of said handle when the apparatus is thereafter pivoted on said stud about said handle and toward the central portion thereof; and a fuse holder supporting arm extending from said bifurcated member at a point removed from said bifurcations and on the opposite side of said opposed portions from said stud and having a supporting surface extending generally parallel to the latter.

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