May 27, 1941. H. D. GRINNELL 2,243,528

FUSE REMOVER

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Fig. 1.

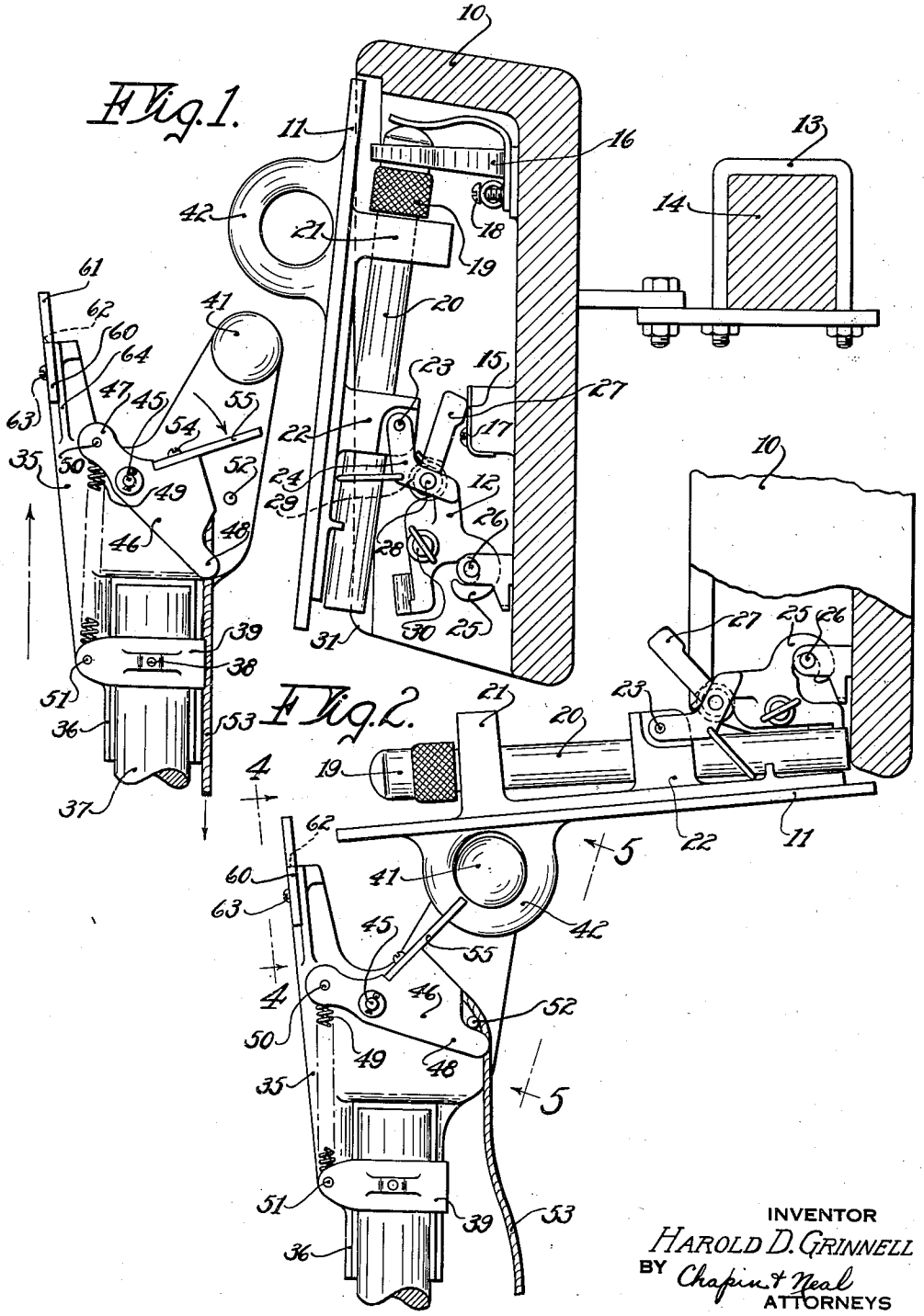


Fig. 2.

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Fig. 3.

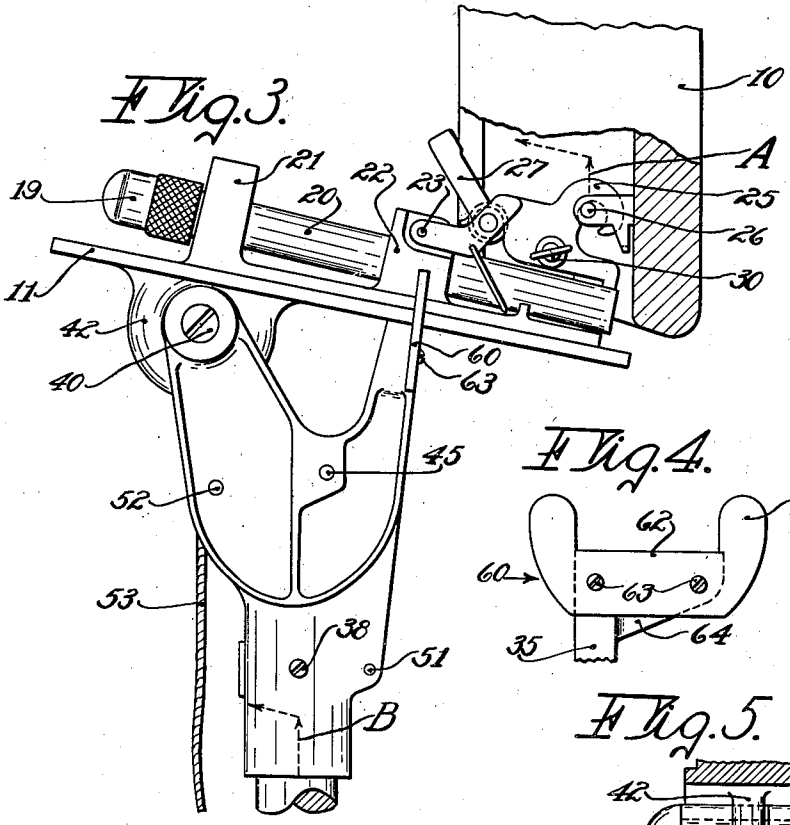


Fig. 4.

Fig. 5.

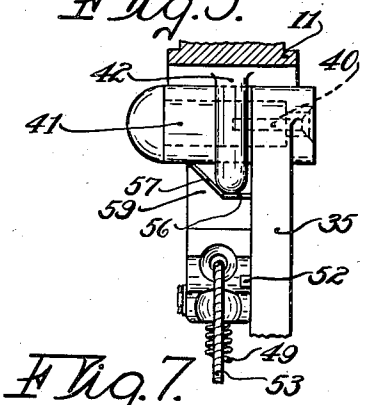


Fig. 6.

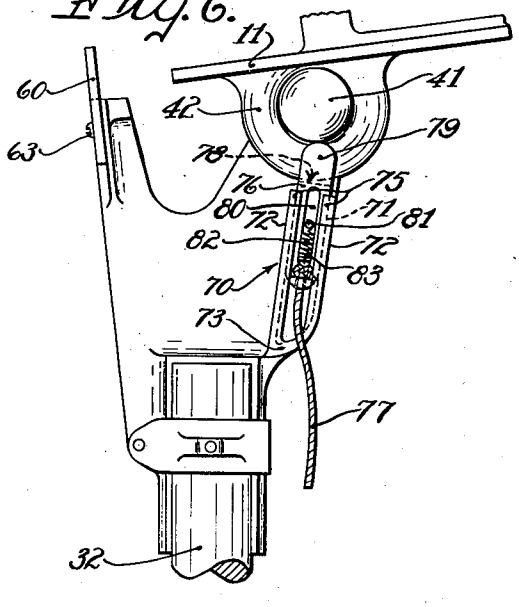
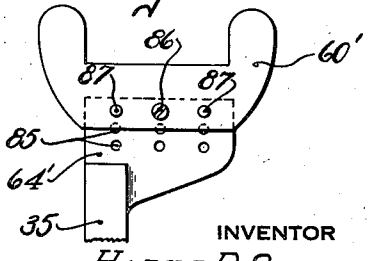


Fig. 7.



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FUSE REMOVER

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Application April 26, 1940, Serial No. 331,803

7 Claims. (Cl. 294—19)

This invention relates to a device for removing fuses from fuse cut-outs having drop-out fuse holders.

As is well known, the fuse members of these cut-outs, which are frequently carried on the cross-arms of poles high above the ground, need replacement from time to time. In one form of cut-out the fuse member is carried in a substantially vertical position when the circuit is closed, and bridges a pair of terminals carried by a base member to which it is hinged. This particular type is pivoted at its lower end to the base member, and is arranged to throw the fuse member out of its normal circuit closing position when the fuse is burned out to indicate to an observer that repairs are needed. Likewise the hinge is arranged so that the fuse can be pivoted to a drop-out position and then bodily lifted from the pivot on the base.

One purpose of the present invention is to provide improved means for use by a lineman in removing and replacing fuses from cut-outs of the general type described; in particular, to provide such a means which can be used by a lineman standing on the ground to remove fuses from cut-outs located on the cross-arms of poles. A further purpose is to provide such a device which may be used as a switch hook to swing the fuse member to the drop-out position and then subsequently may be used to lift the fuse member off the base. Another purpose is to provide a device of this class which has two different positions of engagement with the fuse in the first of which the device is used as a switch hook and in the second of which it is used as a fuse remover or replacer. A further purpose is to provide such a device which is positively but removably locked to the fuse holder when being used to remove or replace a fuse. Another purpose is to provide adjustable means on the device whereby it can be adapted for use with fuse members having different drop-out positions for their respective fuse members.

How I accomplish the above and other purposes will appear from the specification and accompanying drawings in which—

Fig. 1 shows my fuse remover about to be used as a switch hook to engage the handle on the door which carries the fuse of an indicating, enclosed type cut-out in which the fuse element has burned out;

Fig. 2 shows the position of the door and fuse remover when the fuse member is moved to the drop-out position;

Fig. 3 shows the fuse remover in position to lift the door and the fuse carried thereby off its pivot;

Figs. 4 and 5 are views taken on the lines 4—4 and 5—5 of Fig. 2;

Fig. 6 shows a modified form of latch for holding the fuse-remover in engagement with the door of the cut-out; and

Fig. 7 is an adjustable form of rest for use with the fuse remover to accommodate fuse members which in their drop-out position lie at a different angle to their base member from that shown in Fig. 2.

Referring now to Figs. 1 to 3, I have shown my fuse holder as being used with an indicating, enclosed type cut-out of well known form, but its applicability to other types will be readily apparent. The operation of this type of cut-out is so well known that it will be described only in sufficient detail to make it clear how the fuse remover functions to remove a burned out fuse.

Thus, in Fig. 1, the cut-out consists generally of a box-like base 10 provided with a cover 11 hinged by a toggle mechanism 12 to the base. The cut-out is secured as by clamp 13 to the cross-arm 14 of a pole (not shown). The base carries a pair of contacts 15 and 16 to which may be secured the ends of a current carrying wire as by screws 17 and 18. The upper contact 16 is adapted to removably embrace a metallic thimble 19 affixed at one end of a fuse tube 20 which is carried in journals formed in bosses 21 and 22 of the cover.

Boss 22 is pivoted by a pin 23 to one end of a link 24 of the toggle mechanism 12. Link 24 has a hook-shaped eye 25 formed at the opposite end by which it engages a pintle 26 on base member 10. Intermediate its ends, link 24 is provided with a dog 27 which is constantly urged in a clockwise direction around a pivot 28 and against contact 15 by a helical spring 29. The result is that the cover is always being forced in a clockwise direction as respects contact 16 when the parts are in the position of Fig. 1.

In normal operation, a fuse wire, not shown, is secured to thimble 19, passed down through tube 20 and wound up tightly around a thumb screw 30 threaded into link 24, so that the cover will be flush with the edge 31 of the base in spite of the action of dog 27 and spring 29. There is then a path for electricity from contact 16 through the fuse wire and toggle mechanism to contact 15. When the fuse wire is ruptured and opens the electrical circuit just described, the cover 11 immediately is thrown to the position

of Fig. 1 which is an indication to an observer that the circuit is broken.

On observing the cover positioned as in Fig. 1, the lineman removes the cover so that he may repair the fuse by swinging the cover around pintle 26 to the drop-out position shown in Fig. 2 and then rotating it slightly in a clockwise direction around pivot 26 to the position of Fig. 3 when the entire cover assembly may be lifted off the pintle 26 as shown by the broken arrow A in Fig. 3. Inasmuch as this operation, as well as the cut-out itself, is well known by those skilled in the art, it is believed that the foregoing description will suffice for the purposes of disclosing my invention.

Referring to Figs. 1 to 3, the fuse remover consists of a flat Y-shaped casting 35 provided at the butt with a socket 36 adapted to fit over the end of a suitable pole 37, and secured in position by a screw 38 passing through the butt and pole and threaded into clamp 39. At the opposite end, one of the bifurcations of casting 35 has attached thereto as by a screw 40 (see Fig. 5) a laterally extending stud 41. This stud 41 is of the right diameter to fit into a hole in the handle 42 in the cover 11, and has a dome-shaped end to aid in inserting the stud into the handle.

Pivoted to the body of the casting 35 between the bifurcations, as at 45, is a dog 46 having arms 47 and 48. A spring 49 is connected at one end to a pin 50 fixed in arm 47 and at the other end is hooked over a pin 51 extending laterally from the butt of the casting 35 into a lug formed integrally with clamp 39. This spring is under tension and constantly biases dog 46 around pivot 45 so that the arm 48 will abut a pin 52 extending from the casting as shown. A cord 53 is attached to dog 46 and hangs downwardly so that its end may be grasped by the lineman to pull the arm 48 away from pin 52.

Affixed to arm 48 adjacent the pivot 45, as by screw 54, is a flat locking plate 55. This plate extends radially from the pivot 45 and at its outer end has (see Fig. 5) an irregular shaped edge composed of a straight portion 56 and a slanting portion 57 which together form a substantially triangular tooth 59.

When tension is exerted on the cord 53 to rock the dog 46 as shown in Fig. 1, the stud 41 may be inserted into the handle 42 of the cover of the cut-out. Then when the cord is released and the dog pulled back to its biased position by the spring 49, the tooth 59 will act as a lock to hold the fuse remover secured to the cover, as is clear from Figs. 2 and 5. Used in the way shown in Figs. 1 and 2 the fuse remover serves as a convenient switch hook to open the cut-out cover to the drop-out position.

Mounted on the other bifurcation parallel to stud 41 is a saddle 60. This saddle consists of a flat plate-like member having formed on its upper edge a pair of upstanding ears 61 separated by a straight portion 62 and is mounted as by screws 63 on a laterally extending web 64 on casting 35. The straight portion 62 substantially corresponds in length to the width of the cover member 11 and is arranged on the casting so that with the pole 37 held vertical the portion 62 is substantially horizontally in line with the axis of the stud 41.

After the cover is moved to its drop-out position of Fig. 2 by using the fuse remover as a switch hook, the cord 53 is pulled to move the dog 46 and locking plate 55 to the non-locking position of Fig. 1 and the stud 41 is slipped out of the handle 42. Then, the fuse remover is turned through 180° around its vertical axis and the stud 41 reinserted and locked in position. The pole 37 is thereupon raised until the parts are positioned as in Fig. 3 with the cover 11 of the cut-out resting on the straight portion 62 of the saddle 60. The cover is then removed by manipulating the pole 37 as shown by the broken arrow B in Fig. 3. Due to the fact that the cover rests between the ears 61 of saddle 60 during this removal operation and the stud 41 is locked in position in the handle 42, the lineman can easily carry out the movement necessary to lift the cover off its pivot and can do so without danger of dropping it.

As will be evident from the foregoing, the operation of removing the fuse consists of two simple steps—first that of inserting the stud 41 in the handle as in Fig. 1 and using the fuse remover as a switch hook to swing the cut-out cover to drop-out position of Fig. 2 and second, that of removing the stud from the handle, turning the fuse remover around, reinserting the stud, and raising the cover to the position of Fig. 3 when the cover can be easily removed by an upward and lateral movement as shown by the arrows A and B. It will also be clear that after the fuse is repaired it can readily be reinserted by performing in reverse the removal operations shown by Figs. 1 to 3.

Referring now to Fig. 6, the function of the dog 46 and locking plate 55 can be performed by the modified structure shown. Thus a laterally extending web 70 is formed preferably integrally with the casting 35 and below the stud 41 and is provided with a slot 71 extending downwardly between its side walls 72. Where this slot 71 intersects the end wall 73 it is narrowed so that the portions 75 of the end walls form overhanging lips. A plunger 76 is mounted to slide up and down in the slot 71 and has a cord 77 attached to its lower end and protruding through the narrowed portion of the slot between lips 75. Along its upper edge the plunger is formed with a flat portion 78 and an end portion 79 which perform the locking function of the flat portion 56 and tooth 59 of the locking plate 55 shown in Fig. 5. This plunger 76 in addition is provided with a slot 80 having closed ends and straddling a pin 81 fixed to the body of the casting and extending laterally therefrom, into the slot 80. A spring 82 is fastened at one end to this pin 81 and at the other end to a pin 83 extending transversely of slot 80 at the lower end. As is clear from Fig. 6, the spring 82 serves to bias the plunger to the position where it will lock the stud 41 to the handle of the cover 11.

Frequently, due to the manner in which the cut-outs are mounted on the pole or other supporting structure, the position to which the cover 11 must be moved before it can be lifted from its pivot as shown in Fig. 3, may vary for respective cut-outs. Therefore the mounting for the saddle 60 can be conveniently modified so that with the cover resting on the saddle and ready to be removed the pole can be held substantially vertically which is the easiest way of performing this operation. In Fig. 7, the web 64' of casting 35 is formed with parallel rows of holes 85 and the saddle 60 is mounted in the chosen row by means of a screw 86 passing through the saddle and threaded into the center hole of the chosen row with pins 87, fixed to the saddle 60', extending into the end holes to

lock the saddle in position. By using one or the other row of holes the saddle can thus be adjusted up or down.

As will be apparent, while I have shown my fuse remover as constructed for operation with one particular type of cut-out, its applicability to other forms will be readily appreciated once its principles of operation are understood. I therefore do not limit myself to the exact structure shown but intend to include all equivalent structures having the same principle of operation.

I claim:

1. A pole-supported device for use with drop-out fuse cut-outs in which the fuse carrying member may be removed from the cut-out in drop-out position of the member by rotating the member slightly and then lifting it off its support on the cut-out, said device comprising means to pivotally engage the unsupported end of the fuse carrying member in drop-out position, means to removably lock said first named means to the fuse carrying member, and means to engage and support said fuse carrying member intermediate its supported and unsupported ends while the unsupported end is locked to the pivotal means, whereby the fuse carrying member may be given bodily upward movement as the first named means is raised, to thereby lift the supported end of the fuse carrying member off its support.

2. A pole-supported device for use with drop-out fuse cut-outs in which the fuse carrying member may be removed from the cut-out in drop-out position of the member by rotating the member slightly and lifting it off its support on the cut-out, said device comprising means to pivotally engage the unsupported end of the fuse carrying member in either of two relations, means to removably lock said first named means to the fuse carrying member in either relation, and means to engage and support said fuse carrying member intermediate its supported and unsupported ends and hold it for bodily upward movement when the first named means is secured by the locking means in engagement with the unsupported end of the member in one of the two relations, with the member in drop-out position, whereby the fuse carrying member may be given bodily upward movement as the first named means is raised to thereby lift the supported end of the fuse carrying member off its support.

3. A pole-supported device for use with drop-out fuse cut-outs in which the fuse carrying member may be removed from the cut-out in drop-out position of the member by rotating the member slightly and lifting it off its support on the cut-out, said device comprising a flat support having a bifurcated end, means mounted on one bifurcation to pivotally engage the unsupported end of the fuse carrying member, means carried by the support to releasably lock said first named means to the member, and means mounted on the other bifurcation to engage and support the fuse carrying member intermediate its supported and unsupported ends while the unsupported end is locked to the pivotal means, whereby the fuse carrying member may be given bodily upward movement as the support is raised to thereby lift the supported end of the fuse carrying member off its support.

4. A pole-supported device for use with drop-out fuse cut-outs in which the fuse carrying member is pivoted at one end to the cut-out and provided with a handle adjacent the other end which handle may be used to move the fuse carrying member to a drop-out position wherein the fuse carrying member may be removed from the cut-out by rotating said member slightly and then lifting said member off its pivot, said device comprising a flat support having means at one end to engage the fuse carrying member in drop-out position and lift it off its pivot, said means comprising a stud to engage the handle of said member, a spring pressed locking member for locking said stud to said handle and a saddle spaced from said stud and adapted to engage the fuse carrying member between the handle and pivot while the unsupported end is locked to the pivotal means and hold it for bodily upward movement whereby the fuse carrying member may be given bodily upward movement as the support is raised to thereby lift the fuse carrying member off the pivot on the cut-out.

5. The structure of claim 4 characterized by having said saddle adjustable vertically on said support relative to said stud whereby said saddle may be adjusted to permit the support to be moved in a vertical plane during removal of the fuse carrying member from the drop-out position.

6. A pole-supported device for use with drop-out fuse cut-outs in which the fuse carrying member is pivoted at one end to the cut-out and may be rotated in one direction to a drop-out position wherein the fuse carrying member may be removed from the cut-out by rotating the member slightly in the opposite direction and lifting it off its pivot, said device comprising a flat support having means at one end engageable with the fuse carrying member in two different relations, in the first of which said means is effective to rotate the member in said first direction to drop-out position when the support is lowered and in the second of which relations said means is effective to rotate said member slightly in the opposite direction and then lift it off its pivot when the support is raised.

7. A device for use with drop-out fuse cut-outs in which the fuse carrying member may be removed from the cut-out in drop-out position of the member by rotating the member slightly and then lifting it off its support on the cut-out, said device comprising means to pivotally engage the unsupported end of the fuse carrying member in drop-out position, means to removably lock said first named means to the fuse carrying member and means to engage and support said fuse carrying member intermediate its supported and unsupported ends for bodily movement upward, and a pole for supporting said device, the first and third means of said device being relatively positioned so that when the first named means of said device is engaged with the unsupported end of the fuse carrying member in drop-out position and the pole raised vertically the member will be first rotated slightly and then will be engaged by the third named means on said device and be bodily supported by the joint action of both the first and third means whereby continued lifting of the pole will result in bodily lifting the fuse carrying member off its support.

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