

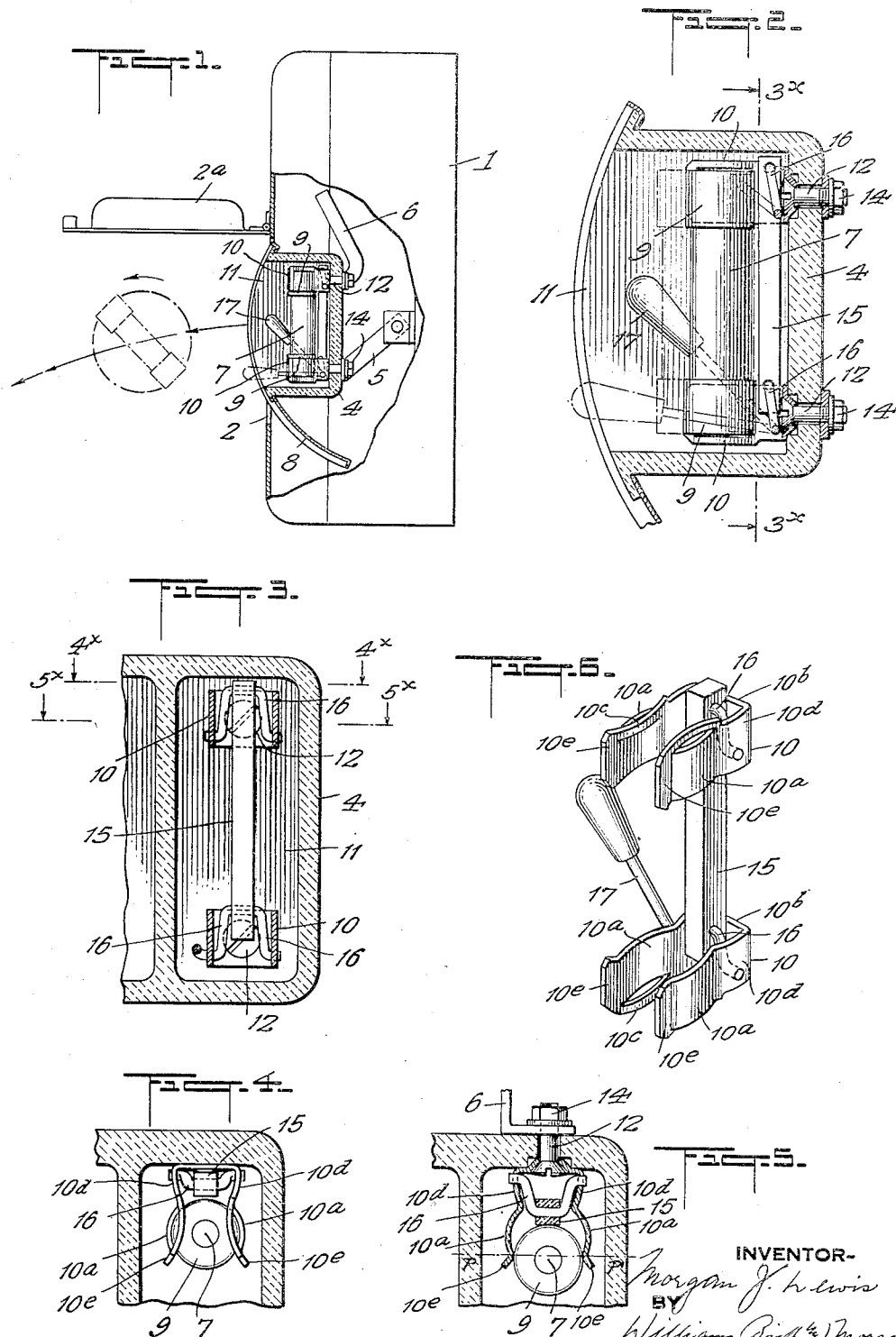
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CARTRIDGE FUSE HOLDER AND EJECTOR

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CARTRIDGE FUSE HOLDER AND EJECTOR

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The present invention relates to fuse holders or clamping devices for connecting cartridge fuses in electrical circuits, and has for its object to provide an ejector in conjunction with the holder which permits the cartridge to be quickly and easily removed and which obviates the danger of the operator contacting a circuit terminal in performing this operation.

A more specific object of the present invention is to provide a device enabling a cartridge fuse to be wholly expelled from the circuit terminal clips with sufficient velocity to carry it out of the usual switch box or eject it from the depression in the porcelain block in which a fuse of this type and their circuit terminals are frequently mounted.

Another object of the invention is to provide a cartridge fuse holder and ejector, which is effective in operation, simple in construction, and low in cost of manufacture.

In carrying out my invention in its broad aspect I provide an ejector element associated with a fuse clip and which is preferably in the form of a lever or crank journaled beneath a fuse and having an arm or actuator extending outwardly at one side of the fuse in a position where it is readily accessible and by a relatively slight movement it will cause the cartridge to be elevated to a position of disengagement on its holding clip. In furtherance of this idea and adapting it to the approved method of mounting cartridge fuses in two circuit terminal clips which support it at its two ends, I provide two such cranks, one in the bottom of each clip, and connect them for simultaneous action so that the two ends of the cartridge are raised together and freed from their respective clips.

In the preferred form of my invention the connection between the two cranks is made by a bar extending lengthwise beneath the cartridge, which bar by its movement parallel to the normal axis of the cartridge engages its ends to raise them simultaneously. In expelling the cartridge I combine the action of the ejector with the spring action of the two arms or sides of the clips, so as to allow these arms to impart a velocity to the cartridge as their ends move inwardly toward each other while in contact with the curved surface of the cartridge. The invention is therefore particularly applicable to fuse holders mounted in fuse boxes or the like and where electrical equipment involves mounting the fuse in a position in which it is not readily accessible. Another advantage of the invention resides in that several fuse holders may be mounted in compact associa-

tion with the other parts of electrical equipments.

The invention will be understood from the following description taken in connection with the accompanying drawing in which Fig. 1 is a profile view of a meter switch box having a portion broken away showing in cross-section a fuse box installed therein; Fig. 2 is a similar view of the fuse box, but enlarged to more clearly illustrate its interior parts; Fig. 3 is a fragmentary cross-sectional view of the fuse box taken on the plane indicated by the line 3×—3× of Fig. 2; Fig. 4 is a fragmentary cross-sectional view of the fuse box taken on the plane indicated by the line 4×—4× of Fig. 3, with a fuse shown properly installed in its clamp; Fig. 5 is a fragmentary cross-sectional view of the fuse box taken on the plane indicated by the line 5×—5× of Fig. 3, with the fuse shown in the act of being ejected from its clip; and Fig. 6 is a perspective view of the fuse holding and ejecting parts.

In the embodiment of the invention illustrated, the cartridge fuse holder and ejector is shown associated with a switch box 1 (Fig. 1), such as used in conjunction with house lighting circuits and other electric circuits. This switch box has an opening 2 providing access to a fuse block 4 usually made of porcelain or other insulating material. The latter is usually recessed to provide compartments for several fuses, one being shown in the drawing. The switch box is equipped with a hinger cover or door 2a adapted to close the opening 2. The switch block 4 here shown for illustrative purposes is movable into and out of co-operative relation with the opening 2 upon the opening and closing of the circuit switch and to this end it is pivotally supported on the arm 5 and carries the knife blade 6 of the switch. These two elements comprise conductors which are secured to the back of the block 4 and provide circuit connections to the fuse holders or clips. An arcuate metal apron 8 is attached to the edges of the fuse block 4 and is adapted to close the opening 2 when said knife switch is in closed position.

Cartridge fuses are provided with caps or terminals 9 at their ends, which engage between the arms of the spring conducting clips. In carrying out my invention, I may employ the usual spring clips, but for the purpose of illustration I prefer to use a special form of terminal clip designated generally by the numeral 10. This clip is of identical design at the two ends of the fuse and comprises oppositely disposed arms having arcuate portions 10a which embrace opposite sides of the fuse. In the embodiment of the invention illustrated, the two clips are disposed in

the compartment 11 of the fuse block 4, their center or base portions 10b being secured to the bottom of the block by screws 12 and cooperating nuts 14. The latter also serve to provide mechanical and electrical connection with the conductors 5 and 6. Endwise displacement of the cartridge 7 is prevented by the bent-in end portions 10c, one being formed on each clip arm.

I form the arms of each clip 10 so as to include further side portions 10d of appreciable height connecting the base 10b and the arcuate portions 10a respectively. At the outer extremities of the spring arms I provide lips or flanges 10e which flare outwardly, these portions on each pair of arms being divergent. The two clips 10 thus formed are rigidly mounted in alinement in spaced relation and form circuit terminals and comprise the fuse holder. At the bottom of the holder is placed the fuse ejector 15 which in this instance comprises a rod of insulating material preferably rectangular in cross-section and having a length substantially equal to that of the fuse. The rod 15 is pivoted at its ends on the center portion of U shaped members or double-cranks 16, the extremities of which are bent outwardly and pivotally engage in openings formed in the side portions 10d of the clip arms. These members 16 may be made of wire, of suitable cross-section, bent into the shape described. The pivots for the members 16 are similarly located in each clip 10, and the distance between them is made equal to the distance between pivotal points in the rod 15. Consequently (assuming the rod 15 to be initially disposed within the interior spaces provided by the side portions 10d), when either one of the members 16 is rotated, the rod 15 is caused to swing outwardly parallel to the axis of the cartridge 7. For imparting this motion to the rod 15, an actuating lever 17 is formed on one end of one of the members 16. In the illustration, this lever 17 is shown associated with the crank arm 16 of the lower clip 10, and is so disposed at one side of the cartridge that outward motion of the rod 15 is caused by a downward pull on said lever. The latter and the member 16, to which it is attached, may be made of a single piece of wire of suitable cross-section.

In Fig. 4 the cartridge 7 is shown held in its normal operating position, with the ejector 15 also in its normal position of rest, a slight clearance space being provided between the cartridge and the ejector. Movement of the lever 17 outwardly will cause the rod 15 in its travel to move the cartridge 7 outwardly as shown in Fig. 5. When the cartridge 7 is thus displaced, its axis has traveled slightly beyond the plane (indicated by the line $p-p'$) of the outer ends of the gripping portions 10a of the clips 10, and the arms of the latter acting under their normal spring tension have just started to recede from their positions of maximum flexure. Consequently, due to the spring compression exerted on the cartridge by these arms, considerable velocity is imparted to the cartridge and its outward movement is accelerated by the divergent end portions 10e in sliding contact with its cylindrical surface, causing it to travel a substantial distance away from the clips or circuit terminals.

From the foregoing description it is apparent that a comparatively short movement of the lever 17 will cause the cartridge 7 to be displaced entirely from compartment 11 of a circuit terminal block, as illustrated schematically by the arrows and dotted lines in Fig. 1. The compartment 11 in which the cartridge is operatively positioned

can thus be made compact, and substantially enclose the cartridge for safety purposes without the necessity of affording space for the insertion of a person's fingers to effect its removal. The invention has the further advantage that the cartridge fuse may be installed where required with electrical equipment in places not readily accessible.

It will be understood from the foregoing description that, if desired, a cartridge may be held in a single clip and discharged therefrom by utilizing one of the U shaped crank arms to move it a sufficient distance to disengage it; also that, if two clips are employed, a single crank arm will be sufficient to disengage one end from one of the clips. The cartridge will then occupy an inclined position, and its free end may be easily engaged by the operator's fingers and the fuse readily removed from the other clip. In practice I have also found that the two crank arms 16 may be made to differ slightly in radius or be differently pivoted on their connecting rod 15 and that such an arrangement will cause one end of the cartridge to be completely disengaged from its clip while the other end is only partly disengaged from the other clip, with the result that the inward movement or closing action of the spring arms of the first-mentioned clip will cause the then free end of the cartridge to describe a circular path so that the cartridge will project outwardly substantially at right angles to its normal position, being restrained against complete dislodgment by retention of the clip from which the other end was only partially disengaged. In this position the operator may readily grasp the cartridge and remove it.

If desired, when one becomes familiar with the operation of the device, the cartridge need not be fully ejected in the manner set forth; but, its velocity may be checked and the cartridge caught by one hand, as it is ejected by the action of the operating lever effected by the other hand. Another mode of operation is to place the thumb and first finger against the cartridge to slightly resist its outward movement and then simply pick the cartridge off the terminal clips, when it has been expelled by the combined movement of the ejector and spring force of the clips acting against the lower side of the fuse.

It is understood that various modifications of the embodiment of the invention illustrated in the drawing and described herein can be made without departing from the spirit of the invention.

What is claimed is:

1. A cartridge fuse holder and ejector comprising two spring clips having side portions adapted to grip opposite sides of a cartridge at its two ends, two crank arms disposed intermediate the side portions of the respective clips below the cartridge, and means for simultaneously moving and operating said arms to disengage the ends of the cartridge from said clips.

2. In a cartridge fuse holder and ejector, the combination with two spaced spring clips having opposite portions for gripping the sides of a cartridge at its ends, of two U shaped members pivoted intermediate said side portions at the bottoms of the respective clips, and means for simultaneously rotating said members to cause them to simultaneously displace the respective ends of the cartridge.

3. A cartridge fuse holder and ejector comprising a pair of alined and spaced spring clips having opposite portions for gripping the sides of a cartridge at its ends, two U shaped mem-

bers pivoted on the bottom extremities of the side portions of the respective clips, a connecting element pivoted to the U shaped members to cause their simultaneous movement, and an actuator for rotating one of the U shaped members to cause the displacement of the two ends of the cartridge from their engagement with said clips.

4. A cartridge fuse holder and ejector comprising a pair of aligned and spaced spring clips

10 having side portions adapted to grip opposite

sides of a cartridge at its ends, two crank arms pivoted intermediate the side portions of the respective clips beneath the cartridge, a bar connecting the crank arms to cause their simultaneous movement, and a lever on one of said cranks accessible at one side of the fuse for operating said crank arms and bar to cause displacement of the cartridge from said clips.

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