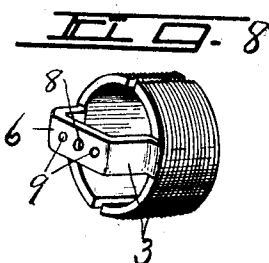
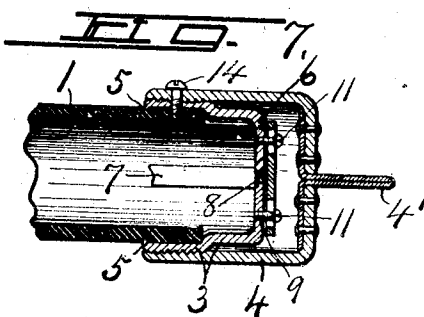
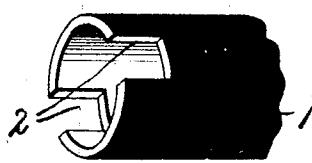
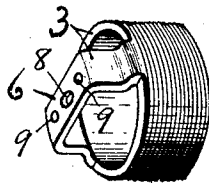
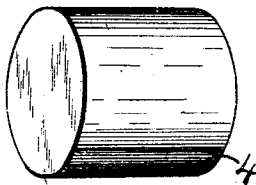
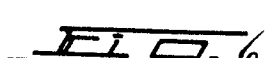
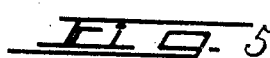
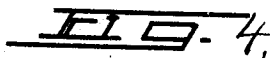
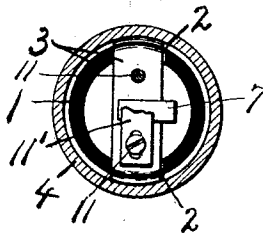
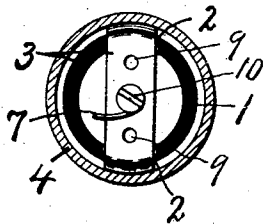
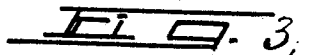
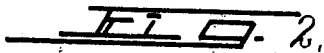
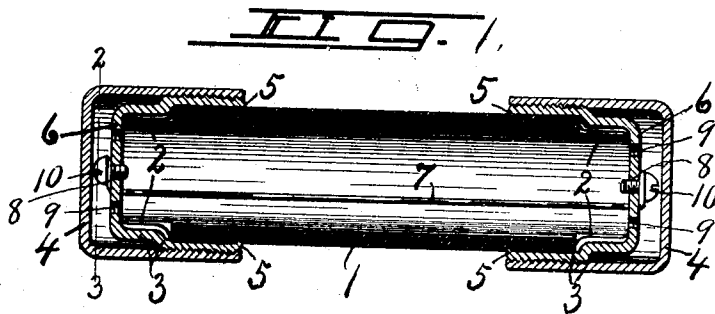


G. W. APPLER.
REFILLABLE FUSE CARTRIDGE.
APPLICATION FILED OCT. 5, 1912.

1,052,202.

Patented Feb. 4, 1913.



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UNITED STATES PATENT OFFICE.

GRAFTON W. APPLER, OF LYONS, NEW YORK.

REFILLABLE FUSE-CARTRIDGE.

1,052,202.

Specification of Letters Patent.

Patented Feb. 4, 1913.

Application filed October 5, 1912. Serial No. 724,150.

To all whom it may concern:

Be it known that I, GRAFTON W. APPLER, of Lyons, in the county of Wayne, in the State of New York, have invented new and useful Improvements in Refillable Fuse-Cartridges, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in refillable cartridge fuses involving the use of a tubular shell or cylinder of vulcanized fiber or other insulating material having opposite end ferrules permanently secured thereto and provided with relatively narrow integral cross bars having suitable attaching means for the opposite ends of a fuse which is passed through the insulator tube, in combination with contact caps adjustably screwing upon the ferrules for closing the ends of the tube and protecting the attaching means for the fuse and also constituting electrical contacts for engaging the usual terminals and thereby connecting the fuse in the circuit.

I am aware that refillable cartridges are not broadly new, some of which employ a special form of fuse with fastening devices peculiar to the construction of the fuse, in which case, it is always necessary to carry a large supply of various sizes of fuse according to the size of the cartridge and current which the fuse is adapted to carry so that the extra expense of these special forms of fuse negatives the advantages of a refillable cartridge and renders their use in large quantities practically prohibitive for the reason that it would be more economical to use the ordinary non-refillable cartridges and throw away the entire cartridge when the fuse is burned out. On the other hand, so far as I have been able to find in the refillable cartridges, employing stock fuse wires, it is practically impossible to thread the wire through the cartridge and connect it at its ends without considerable trouble and more or less uncertainty that a proper connection has been made.

The main object, therefore, of my present invention is not only to provide a simple and comparatively inexpensive refillable cartridge in which stock fuse wire or strips may be used, but also to enable the burned out fuse to be quickly removed and replaced with a new fuse with a greater degree of certainty that a proper connection has been made than has heretofore been practised.

In other words, the stock fuse may be cut off as needed to the desired length according to the size of the cartridge and nature of the current which it is adapted to carry and secured in place within the shell of the cartridge, with the ends of the fuse at all times visible during the attaching operation so that the operator may know for a certainty that the proper connection has been made, after which the contact caps may be replaced on the ends of the ferrules to entirely conceal the fastening means and protect the same against injury or contact with external objects and at the same time the adjustability of the caps at the ends of the cartridges by screwing or unscrewing enables the length of the cartridge to be extended or reduced within a limited range.

Another object is to establish a firm and permanent lock between the ferrules and ends of the insulator tubes and to utilize a portion of the cross bars of the ferrules for this purpose by depressing the sides of the same within suitable recesses or slots in the adjacent ends of the tube.

Another object is to enable the same cartridge to be used for the reception of either wire or flat strip fuses.

Other objects and uses will be brought out in the following description.

In the drawings—Figure 1 is a central longitudinal sectional view of a refillable fuse cartridge embodying various features of my invention. Figs. 2 and 3 are transverse sectional views taken on lines 2—3, Fig. 1, showing wire fuse in Fig. 2 and a flat strip fuse in Fig. 3. Figs. 4, 5, and 6 are perspective views respectively of one of the end contact caps, the adjacent ferrule and the adjacent end of the insulator tube. Fig. 7 is a central longitudinal sectional view of one end of a slightly modified form of fuse cartridge showing the cap as provided with a knife contact. Fig. 8 is a perspective view of a slightly modified form of ferrule divided diametrically to distinguish from the continuous cylindrical form shown in Fig. 5.

In carrying out the objects stated, I provide a tubular (preferably cylindrical) shell —1— of vulcanized fiber or other suitable insulating material which may be of any desired diameter or length according to the nature of the current adapted to be carried by the fuse, said tube having its opposite ends open and each end provided with dia-

metric 1 opposite slots or recesses —2— extending inwardly from the end edge thereof for interlocking engagement with portions of separate metal ferrules —3— presently described. These ferrules are preferably made from thin sheet metal of sufficient thickness to permit the main body thereof to be threaded externally for the reception of separate internally threaded contact caps —4—.

10 The main body or base of each of the ferrules is cylindrical and of just sufficient size or diameter to fit snugly upon the periphery of the adjacent end of the insulator tube —1— at the inner end of the adjacent slots or recesses —2— in which position it is held against rotation by an inwardly crimped annular shoulder —5—, the latter being compressed or contracted after the ferrule has been placed upon the tube so as to embed itself slightly in said tube to prevent withdrawal of the ferrule therefrom as well as to partially lock the ferrule and tube against relative position. As an additional means for preventing the relative rotation of each ferrule upon the tube, the outer end of such ferrule is provided with a relatively narrow U-shape cross bar —6— having its ends integral with diametrically opposite sides of the main body or cylindrical portion of the ferrule and compressed inwardly toward each other within the external diameter of such main body so as to enter the slots or recesses —2— as shown more clearly in Fig. 1 and thereby effectively locking the tube and ferrules against relative rotation, it being understood that the slots —2— and cross bar —6— are of substantially the same circumferential width so that the cross bars may closely fit in their respective recesses.

40 As previously intimated, the cross bars —6— are of considerably less width than the main bodies of their respective ferrules and also of considerably less width than the interior diameter of the tube —1— so as to leave relatively large spaces between opposite sides of the bars and corresponding sides of the tube through which the ends of the fusible link, as —7—, may be easily passed in the operation of placing the fuse in operative position, said spaces also serving to permit the removal by gravity of any remnants of the burned out fuses by simply turning the open end of the cartridge upside down after one or other of the caps —4— has been removed. The other portions of the cross bars are, preferably, flat and disposed at substantially right angles to the axes of the tube and are provided with separate sets of openings, as —8— and —9—, for the reception of suitable fastening members, as screws, —10— or —11—, by means of which the ends of the fusible link may be screwed to and against the outer face of the intermediate portions of the cross

bar to establish a perfect electrical connection between the ferrules and link. These ferrules may be stamped or pressed from a flat sheet of metal blank so as to be continuous circumferentially as shown in Figs. 1, 2, 3, 5 and 6, or may be divided diametrically, as shown in Fig. 8, but in either case, the length of the cross bar —6— is less than the external diameter of the cylindrical portion in which the external threads are formed, thereby allowing the axially extending ends of the cross bars to enter the recess in the adjacent ends of the insulator tube —1—.

The contact caps —4—, preferably, consist of sheet metal cups, open at one end and having their opposite ends closed, the length of each cap being somewhat greater than the distance from the outer face of the adjacent cross bar —6— to the inner ends of the slots or recesses —2— so as to extend beyond the ends of the cross bars which are at their junctions with the main bodies of the ferrule, the interior diameter of such caps being substantially equal to the external diameter of the threaded portion of said ferrule. The inner open ends of each cap is threaded internally and screwed upon the externally threaded portion of the ferrule, thereby permitting said cap to be adjusted longitudinally or axially of the tube by rotation in one direction or the other according to whether it is desired to extend or shorten the length of the cartridge. When the caps —4— are placed in operative position or secured upon the threaded portions of their respective ferrules —3—, their outer closed ends effectively conceal and protect the attached members, as the screws —10— or —11—, against contact with external objects and also affords and imparts to the cartridge in general a smooth and characteristic appearance and enables the cartridge, as a whole, to be readily inserted into and withdrawn from the terminals of a circuit.

The fusible link —7— may be made either of stock wire, as shown in Figs. 1 and 2, or from stock strips, as shown in Figs. 3 and 7.

When the fuse wire is used, its ends are fastened in place to the central apertures of the cross bars by the screws —10—, but when the flat stock strips are used, their ends are fastened in place by screws —11— and a clamp plate —11'— as shown more clearly in Figs. 3 and 7.

In some instances, it may be necessary to provide the caps —4— with knife contacts —4'— as shown in Fig. 7, in which case, the caps —4— are preferably locked against rotation to their adjacent ferrules —3— by means of set screws —14— or equivalent fastening means, the object being to maintain the knife contacts —4'— in the same plane.

The operation of my invention will now be readily understood upon reference to the foregoing description and the accompanying drawings and it will be evident that the contact caps may be provided with other forms of contacts than that shown in Figs. 1 and 7 and that other slight changes may be made in the details of construction without departing from the spirit of this invention.

What I claim is:

1. In a refillable fuse cartridge, an insulator tube open at both ends, metal ferrules secured to said ends, against rotation thereon, and each provided with a relatively narrow cross bar united to diametrically opposite sides thereof across the adjacent open end of the tube a fusible link within the tube and having its ends passed through the spaces between the bar and tube and attached to the outer faces of the bars, and contact caps covering the cross bars and open ends of the tube and adjustably secured to the adjacent ferrules.

2. A refillable fuse cartridge comprising a tubular shell of insulating material open at both ends, metal ferrules tightly secured to the opposite ends of the shell against rotation and provided with cross bars extending across the open ends of the shell and

integrally united to opposite sides of the main bodies of the respective nipples, said cross bars being of less width than the interior diameter of the shell to provide open spaces between opposite edges of the cross bars and adjacent sides of the shell, a fuse member within the tube having its ends passed through such space and secured to the intermediate portions of the cross bars and metal contact caps screwing upon the nipples and provided with closed outer ends covering the adjacent cross bars.

3. A refillable fuse cartridge comprising a tubular shell of insulating material at both ends, metal ferrules secured to the ends of said shell against rotation and provided with cross bars extending across said open ends and of considerably less width than the interior diameter of the shell, a fuse member within the shell, separate clamping devices on the cross bars for clamping the ends of the fuse member thereto and contact caps covering the cross bars and screwed upon the adjacent ferrules.

In witness whereof I have hereunto set my hand this 3d day of September, 1912.

GRAFTON W. APPLER.

Witnesses:

H. E. CHASE,

EVA E. GREENLEAF.