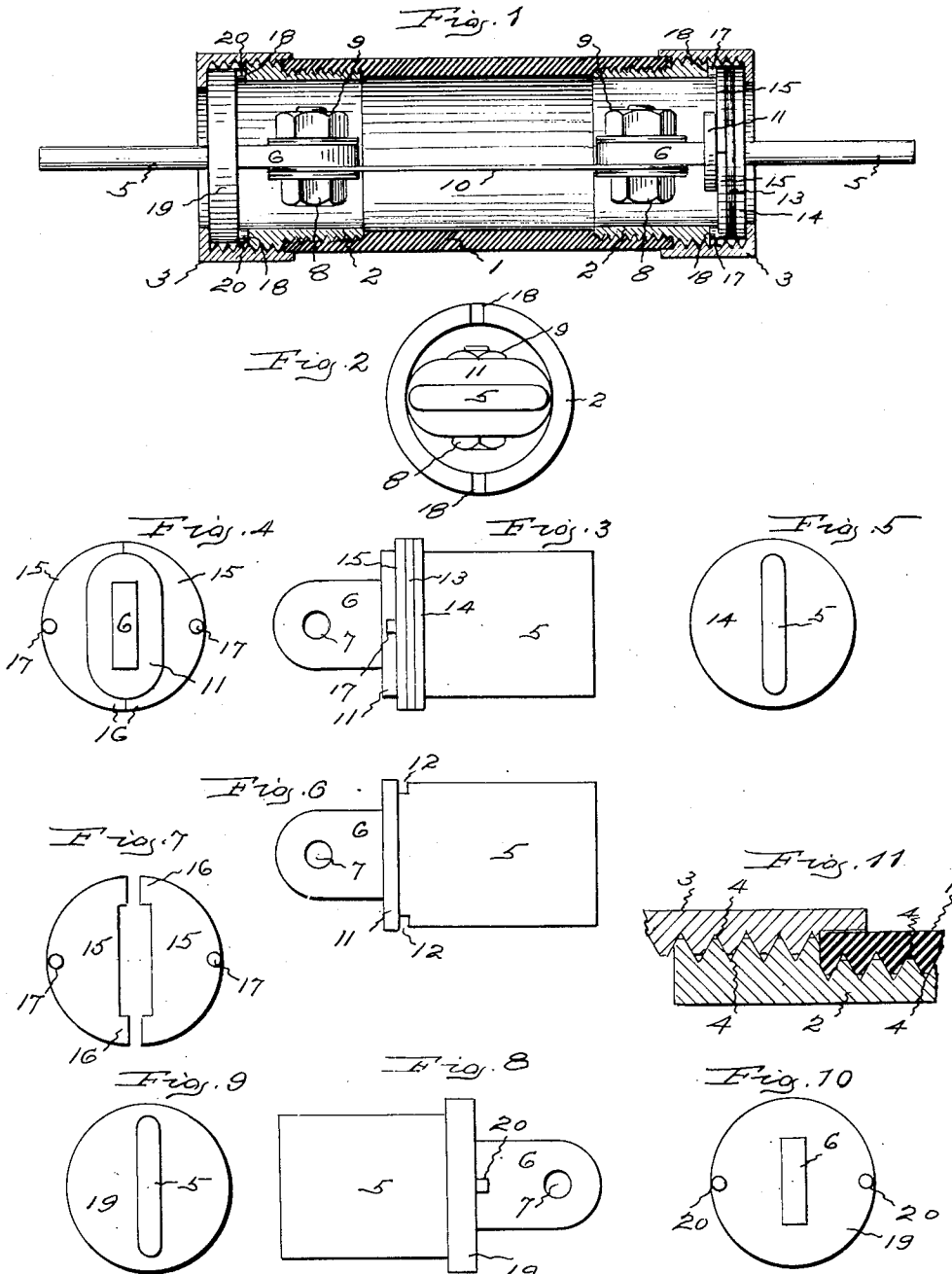


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RENEWABLE FUSE.
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1,400,660.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ROBERT C. COLE, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Renewable Fuses, of which the following is a specification.

This invention relates to the construction of inclosed electric fuses which are commonly known as renewable cartridge fuses, that is, those fuses which, when the fusible link is melted, can be quickly taken apart and a new link substituted, and particularly to the type of knife-blade contact fuses of this class.

The object of the invention is to so construct a fuse of the character mentioned that it may be cheaply manufactured, quickly assembled for service and easily taken apart for renewal, and will have sufficient mechanical strength to sustain any internal pressure which can result from the conversion of the metal of the fusible link from a solid to a gaseous condition with the incident liberation of heat and burning of the arc due to excess or abnormal current flow, without the emission of any flash or flame.

Figure 1 of the accompanying drawings is a view of a fuse which embodies the invention with the casing and ferrules cut in central section to show the interior construction. Fig. 2 is a view looking toward one end with the ferrule washers and cheek pieces removed. Fig. 3 is a side view of one of the terminals with the washers and cheek pieces that close the end of the casing and lock the terminal. Fig. 4 is a view looking toward the inner end of the terminal. Fig. 5 is a view looking toward the outer end of the terminal. Fig. 6 is a side view of the terminal. Fig. 7 shows the cheek pieces which are utilized to lock the terminal. Fig. 8 shows a side view of a terminal that may be used at one end of the casing. Fig. 9 is a view looking toward the outer end of the latter terminal. Fig. 10 is a view looking toward the inner end of the modified terminal. Fig. 11 shows, on enlarged scale, a section of a portion of the casing, metal end sleeve, and ferrule, illustrating a manner of connecting these parts and providing two long but restricted spiral paths over metal for the relief of any internal pressure resulting from the blowing of the fuse.

The casing 1 of the fuse is formed of a tubular section of insulating fiber or other suitable insulating material. At each end the casing is provided with an interior thread, and screwed into each end is a metallic bushing 2 which has an exterior thread designed to be screwed into the casing and an exterior thread designed to receive the internally screw-threaded metal ferrule 3 that is screwed on the exposed end of each bushing when the structure is assembled. It is desirable to cut the threads of regular form and full depth in each piece and then to grind off the tops of the threads so as to leave a small spiral channel 4 between the pieces when screwed together, as shown in Fig. 11. This permits the parts to be screwed together very securely but provides two long but restricted channels at each end of the casing for the relief of gas pressure generated when the fusible link melts, and as the gases in flowing through these channels pass over a considerable area of relatively cool metal which quickly absorbs the heat liberated, the gases become thoroughly chilled so that no flame will be emitted when the fuse blows, no matter how violent the action.

Each terminal has an exterior blade 5 for engagement with the usual circuit terminal clip and an interior lug 6 provided with a perforation 7 for the passage of the bolt 8 which with the nut 9 is employed to detachably secure the end of the fusible link 10 to the terminal. Permanently fastened on at least one of the terminals at the junction of the blade and lug is an oblong stirrup 11, the longer diameter of which is substantially the same or slightly less than the inner diameter of the bushing into which it fits. Just outside of the stirrup the edges of the blade are cut away, forming notches 12. Slipped upon the blade of this terminal and fitting closely thereto is a packing washer 13 of flexible material, such as leather or cloth, and outside of this is a metallic washer 14, these washers being circular in outline and of greater diameter than the opening in the bushing. Between the packing washer and the stirrup is a divided washer formed of two cheek pieces 15. These cheek pieces are substantially semi-circular, and are cut away so that they will fit upon the blade with their ends 16 fitting closely together in the notches in the edges of the terminal next

to the stirrup. The two cheek pieces when put together are substantially the same diameter as the washers, that is, when assembled they form a circle which is larger than the opening in the metallic bushing that is screwed into the end of the casing. Projecting inward from each of these cheek pieces is a stud 17 that is designed, when the cheek pieces are placed in position, to lie in a slot 18 milled in the outer edge of the metallic bushing.

When this terminal is placed in the casing the cheek pieces are slipped upon it from opposite sides and brought together with the studs extending into the slots in the bushing. Then the packing washer and metallic washer are slipped up on the blade close against the cheek pieces and the ferrule is screwed up tightly against the metallic washer. This clamps the washers and cheek pieces closely together and tightly against the end of the metallic bushing, the cheek pieces with their studs preventing the terminal from being rotated and the whole securely closing the end of the casing except for such passages as may be left around the screw threads as previously described. The ferrule fits upon the metal bushing so there is no danger of crossing or breaking the threads when it is screwed on for originally assembling or after renewal of the fuse, and as the ferrule is screwed upon the metal bushing and the washers and cheek pieces are held between the end of the metal bushing and the metal flange of the ferrule, a very strong, firm contact is made. The cheek pieces lock the terminal against movement in and out and hold it against rotation, and the stirrup acts as a baffle plate and prevents gas from blowing up around the faces of the blades being pressed tightly thereon.

Such a terminal as has been described may be used at each end of the fuse, but if desired for the purpose of simplifying the construction and process of assembling, the terminal may be provided with a single fixed washer 19 provided with studs 20 adapted to enter the slots 18 in the edge of the bushing, as shown on the left in Fig. 1. In this case the terminal is held securely in position by screwing the ferrule upon the metal bushing so that the flange of the ferrule forces the washer tightly against the end of the bushing.

With the parts assembled in this manner the ferrules are easily removed after repeated blowings of the fuse, as the engaging threads of the removable parts are metal, and on account of this they can be made to fit tighter and can be stronger than if one thread was in the insulation, and passages for the relief of the internal pressure are provided, without danger of the ferrules becoming set on the ends of the casing so as to result in damage to the structure when

it is desired to disassemble the parts for renewing the fusible link.

The invention claimed is:

1. An inclosed fuse having an insulating casing, a metallic bushing screwed into the end of the casing, a conducting terminal plate extending into the bushing, a divided washer and an imperforate washer both fitted on the terminal outside of end of the bushing, said washers being circular and larger in diameter than the opening through the bushing, the former washer being removable transverse of the terminal and having means engaging the end of the bushing to prevent its rotation and the latter washer being removable longitudinally of the terminal, means fixed on the terminal inside of and covering a portion of the joint of the divided washer, and a ferrule screwed upon the exterior of the bushing and compressing the washers between the end of the bushing and the ferrule.

2. An inclosed fuse having an insulating casing, a metallic bushing screwed into one end of the casing, a conducting terminal plate with notched edges extending into said bushing, said notches in the terminal plate being outside of the end of the bushing, semi-circular cheek pieces fitting the notched portion of the terminal outside of and closing the outer end of said bushing, a washer movably fitted on the terminal outside of the cheek pieces, and a ferrule screwed on the bushing against said washer.

3. An inclosed fuse having an insulating casing, a metallic bushing screwed into one end of the casing, a conducting terminal plate with notched edges extending into said bushing, said notches in the terminal plate being outside of the end of the bushing, a stirrup fixed on the terminal inside of the notches therein, said stirrup being wider than the thickness of the terminal and as long as the inner diameter of the bushing, semi-circular cheek pieces fitting the notched portion of the terminal outside of the stirrup and end of the bushing and closing the outer end of said bushing, a washer movably fitted on the terminal outside of the cheek pieces, and a ferrule screwed on the bushing against said washer.

4. An inclosed fuse having an insulating casing, a metallic bushing with slots in its outer edge screwed into one end of the casing, a conducting terminal plate with notched edges extending into said bushing, said notches in the terminal plate being outside of the end of the bushing, semi-circular cheek pieces fitting the notched portion of the terminal outside of and closing the outer end of said bushing, means projecting from the cheek pieces into the slots in the edge of the bushing, a washer movably fitted on the terminal outside of the cheek pieces, and a

ferrule screwed on the bushing against said washer.

5 5. An inclosed fuse having an insulating casing, a metallic bushing screwed into the end of the casing, a conducting terminal plate with notched edges extending into the bushing, said notches in the terminal plate being outside of the end of the bushing, two semi-circular cheek pieces embracing the notched portion of the terminal outside of and closing the outer end of said bushing, a washer movably fitted on the terminal outside the cheek pieces, said washer being circular and larger in diameter than the opening through the bushing, and a ferrule screwed upon the exterior of the bushing and compressing the washer against the cheek pieces.

10 6. An inclosed fuse having an insulating casing, a metallic bushing screwed into the

end of the casing, a conducting terminal plate extending into the bushing, a baffle plate fixed tightly upon said terminal plate inside of the bushing, said baffle plate being as long as the inner diameter of the bushing and having its outer face flush with the end of the bushing, a divided transversely removable locking washer engaged with the terminal plate outside of the end of the bushing and having its joints with the terminal covered by the baffle plate, an imperforate longitudinally removable washer fitted on the terminal outside the divided washer, said washers being circular and larger in diameter than the opening through the bushing, and a ferrule screwed upon the exterior of the bushing and compressing the washers between the end of the bushing and the ferrule.

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