R. C. COLE.

INCLOSED FUSE.

APPLICATION FILED MAR. 13, 1909. RENEWED JAN. 4, 1912.

1,025,247.

Patented May 7, 1912.

Fig: 1,

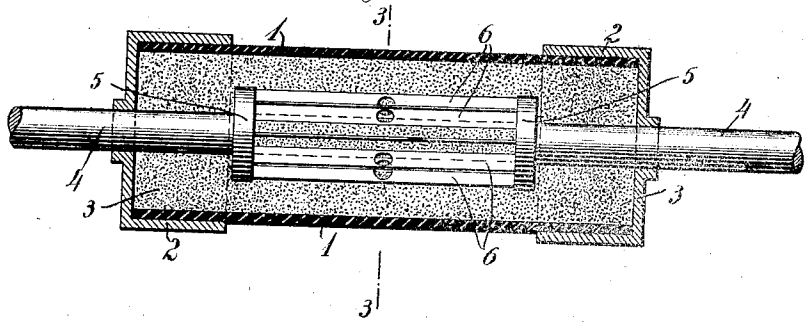


Fig: 2,

Fig: 3,

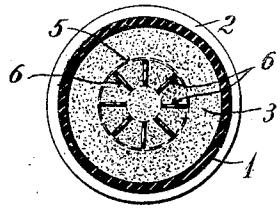
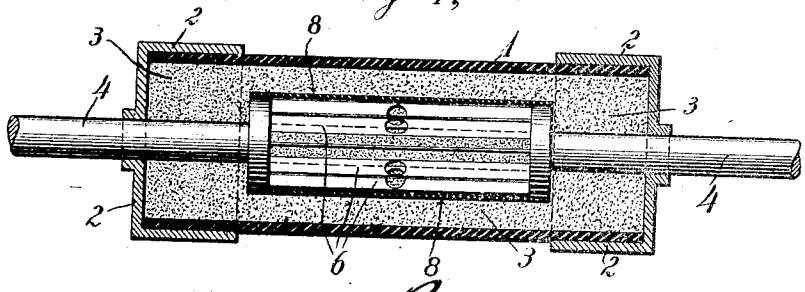


Fig: 4,



Witnesses:

Clifford A. Klos.

H. S. Kinnear

Robert C. Cole Inventor

By his Attorney

Peterson & Kinnear

UNITED STATES PATENT OFFICE.

ROBERT C. COLE, OF WEST HARTFORD, CONNECTICUT, ASSIGNOR TO THE JOHNS-PRATT COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF CONNECTICUT.

INCLOSED FUSE.

1,025,247. Specification of Letters Patent. Patented May 7, 1912.

Application filed March 13, 1909, Serial No. 483,249. Renewed January 4, 1912. Serial No. 669,438.

To all whom it may concern:

Be it known that I, ROBERT C. COLE, a citizen of the United States, residing at West Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Inclosed Fuses, of which the following is a full, true, and concise specification.

This invention is an improvement in the construction of inclosed electric fuses, and particularly in fuses of the type which employs a filling of comminuted non-conducting material around the inclosed fusible medium, and consists in the construction and disposition of such fusible medium in the form of thin sheets or strips connecting the terminals of the device, as hereinafter described, whereby the rigidity and durability of the structure is promoted and a maximum extent of surface area is provided, having effective contact with the filling material at all points.

The invention also involves incidental features of construction and arrangement contributing toward the result just stated, but also useful in other relations, as will be apparent from the following description and as more particularly pointed out in the claims.

Referring to the sheet of drawings constituting a part hereof, Figure 1 is a longitudinal section, with parts in elevation, of an inclosed fuse embodying my invention; Fig. 2 is an enlarged detail of the conducting element thereof, with parts in central section; Fig. 3 is a cross-section of Fig. 1 on the line 3—3; and Fig. 4 is a longitudinal central section, with parts in elevation, of a modified form.

The inclosed fuse illustrated in Figs. 1 to 3 comprises a tube or casing 1 of fiber or other non-conducting material provided with ferrules 2 at its opposite ends and constituting an inclosure for a mass of filling material 3. This filling material may consist of slaked-lime, gypsum, or any other suitable non-conducting material or composition in comminuted form, as customarily employed in the manufacture of inclosed fuses. The inclosure contains two fuse link terminals 4, suitably supported within the casing, and extending to or connected with the exterior of the ferrules, whereby they may be electrically connected with the terminals of the circuit in which the device is to be employed. In the form taken for illustration, the terminals are round rods held in central apertures in the ferrules, which latter are of metal, and either the projecting ends of the rods or the ferrules, or both, may be secured in contact with the circuit terminals, according to the type of the latter. The proximate ends of these rods or terminals, within the casing, are joined by the fusible medium, consisting, as above stated, of a plurality of strips or flat fuse links 6 adapted to melt and open the circuit upon the passage therethrough of a current of abnormal conditions. The two terminals and the fusible medium constitute together the conducting element of the device through which the current passes from one end to the other, and in the manufacture of inclosed fuses, it is customary for these or equivalent parts to be separately assembled and introduced as a whole into the interior of the casing, which is then filled with the filling material and closed with the ferrules. The fusible medium, being of metal which has a low melting point and being also frequently weakened by calibration notches or perforations, as shown at 6^a forms a somewhat fragile connection between the terminals, so that the conducting element is quite liable to injury or mechanical rupture either during the process of its assemblage or afterward, when it is inclosed within the casing, and the resulting structure becomes defective or impaired in value as a consequence. This is particularly likely to occur with multiple strips where injury to one of the group is apt to escape notice. This invention seeks to overcome or reduce the objection due to this cause, by the construction of the fusible medium out of sheet metal having three or more flat or substantially flat and straight members or fuse links, which are disposed in intersecting planes, parallel with the axis of the device and directly and rigidly secured at their ends to the proximate ends of the fuse link terminals. The latter are provided with lateral enlargements, in the shape of circular disks 5 opposing each other, and the several flat strips 6 are soldered in butt contact with the faces of these disks, as indicated in the drawing, so that one or more of such strips will offer its edgewise resistance, and hence its greatest resistance, to lateral strains in any direction in the conducting

element, thereby enabling the assembled terminals and fusible links to be handled freely and rapidly without danger of fracture. The resulting structure possesses remarkable rigidity even when the fusible medium is constructed of extremely thin strips.

In the preferred form the disks 5 are cup-shaped, as shown, and the ends of the flat strips are embedded in a mass of solder contained within the cup, thereby readily forming a secure mechanical connection with an adequate electrical continuity between said strips and the terminals, but other modes of connection may be employed provided all of the strips or faces are connected directly to the common rigid terminal such as afforded by the disk and the solder. The disposition of the multiple flat strips with their flat faces in intersecting or radial planes provides between them a series of inwardly converging, wedge-shaped spaces into which the filling material will readily find its way when introduced through the end of the casing, so that complete effective contact of the filling material against the entire exposed surface of the fusible medium is thereby insured in a most compact and efficient manner. A strictly radial arrangement of the strips, as shown in the drawing, is preferred.

The modified form of Fig. 4 includes with the structure above described a supplemental casing or sheathing 8, made preferably of asbestos, which surrounds the fusible links and fits snugly over the periphery of the circular disks 5, thus forming with them an interior and auxiliary inclosure for the fusible medium, which is useful under some conditions for confining and stifling the force of the disruption, as will be understood by those skilled in this art.

I claim the following:

1. A conducting element for inclosed fuses comprising two fuse-link terminals provided with cup-shaped disks at their inner extremities and a plurality of separate, straight, flat fuse links arranged in radial positions with respect to the axis of said terminals and connecting said disks in multiple relation and embedded at their extremities in a conducting material contained within said cup-shaped disks.

2. An inclosed fuse comprising a casing containing a plurality of fuse links formed of flat, straight strips of fusible material arranged in multiple relation and in substantially radial positions with respect to the axis of the fuse, and two fuse link terminals each provided with a lateral enlargement at its inner end, to each of which enlargements the ends of said radially arranged links are directly and rigidly connected, thereby forming a rigid conducting element for insertion within the fuse casing.

3. In an inclosed fuse, a casing containing fuse-link terminals provided with disks at their inner extremities, and a plurality of separate fuse-links secured to and connecting said disks, in combination with an insulating sleeve surrounding said disks and forming therewith an inclosure for said fuse-links.

In testimony whereof, I have signed my name to the specification in the presence of two subscribing witnesses.

ROBERT C. COLE.

Witnesses:

ARTHUR B. PECK,

ALVAN WALDO HYDE.