J. G. CLEMENS.

TUBE FOR FUSES.

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1,396,357. Patented Nov. 8, 1921.

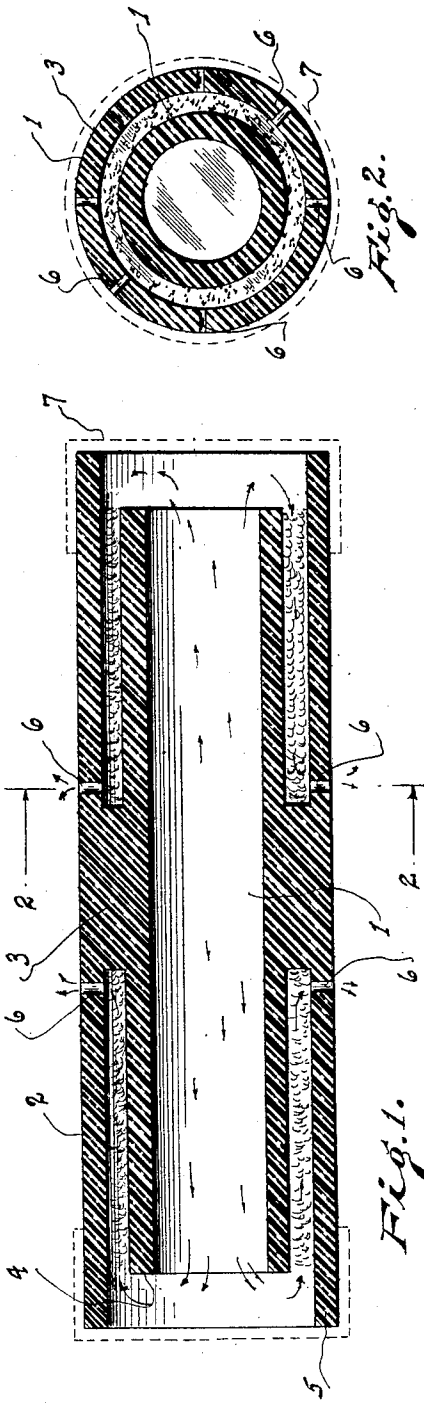


Fig. 1.



Fig. 2.

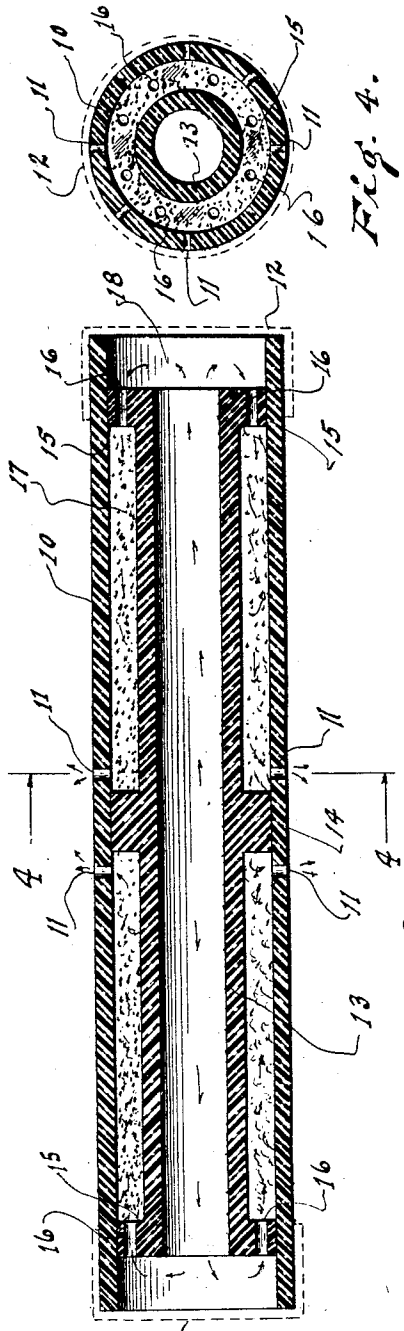


Fig. 3.



Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## TUBE FOR FUSES.

1,396,357. Specification of Letters Patent. Patented Nov. 8, 1921.

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*To all whom it may concern:*

Be it known that I, JOHN G. CLEMENS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Tubes for Fuses, of which the following is a specification.

This invention relates to tubes or casings for electrical fuses and has for its object the provision of an inexpensive tube which will not be destroyed when the fuse blows and which will provide a safe vent for the gases generated by the blowing of a fuse. It has been customary heretofore to construct non-refillable fuses with powder packed around the fuse element for the purpose of retarding the escape of the inflammable gases generated when the fuse is destroyed, and to provide vent holes in the metal end caps of the fuse. Some refillable fuses have been constructed without powder and without vent holes in the end caps, but this type requires a very strong mechanical construction in order to withstand the tremendous gas expansion while other types of refillable fuses have been provided with vent holes in the end caps covered by metal gauze, but this construction is very expensive. My invention, therefore, has for its object the provision of a tube which can be adapted to a fuse of any type and which is just as safe as the original powder-packed fuse. With my present invention the cooling substance is never destroyed nor lost but is retained within the casing or tube which may be used indefinitely, the fusible element being renewed from time to time as may be rendered necessary.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of one form of tube embodying my improvements;

Fig. 2 is a transverse section on the line 2—2 of Fig. 1;

Fig. 3 is a longitudinal section showing another embodiment of the invention;

Fig. 4 is a transverse section on the line 4—4 of Fig. 3.

In the form of the invention illustrated in Figs. 1 and 2, the reference numeral 1 indicates a tube of fiber of the usual dimensions. Extending longitudinally of the tube in the wall of the same from the ends thereof inwardly is an annular recess, groove or chamber 2 which terminates short of the center of the tube which is left solid, as shown at 3. This groove or annular chamber may be formed in any preferred or convenient manner and the inner wall thereby produced is shortened so that its end 4 will be disposed inwardly from the end 5 of the outer wall. Vents 6 are bored through the outer wall to communicate with the chamber 2 at the inner end of the chamber, as clearly shown. The ends of the tube will be closed by the usual caps, indicated at 7, which may be fitted upon the tubes in any of the methods now generally employed and these caps will, of course, carry the usual electrical connections, while the fusible element will be extended between the caps and through the inner bore of the tube, as will be readily understood. Within the annular chamber 2, I place a gas-cooling agent which may be some non-combustible powder or metal gauze rolled into cylindrical form, the gauze, of course, being of such dimensions that its edge will not project beyond the terminal 4 of the inner wall and, therefore, will not produce any short circuits nor interfere in any way with the proper flow of the current. When powder is used as the cooling agent, fiber washers, indicated in dotted lines at 8, may be fitted across the end of the inner wall of the tube and provided with vent openings to establish an uninterrupted passage for the flow of the gases.

It will be readily understood from what has been said and upon reference to the drawings that when a fuse blows the gases thereby generated cannot escape directly to the outer air but will flow through the ends of the inner bore of the tube and will be turned back by the end caps 7 and directed into the annular chambers 2, eventually reaching the vents 6 after flowing through the powder or gauze or other cooling element. The flow of the gases to escape from the fuse is thus prolonged so that by the time they reach the vents they are sufficiently cooled to eliminate all liability of damage from fire or other causes. While powder, such as plaster of Paris, may be employed as the cooling agent, metal gauze is preferred inasmuch as the use of retaining washers is then unnecessary. With my invention there is no necessity for vent holes in the end caps and said caps may, therefore, be produced more expeditiously and at

less cost than at present and will also be stronger.

My fuse tube or casing may be of any desired outline and the invention is not restricted to the specific form which has been described as various changes may be made without involving any departure from the principles of the invention. For instance, in Fig. 3, I have shown the casing as composed of an outer tube 10 having lateral vent openings 11 near its center and adapted to have the usual caps 12 fitted upon its ends. Within the outer tube 10, a second inner tube 13 its fitted and this inner tube is shorter than the outer tube, as shown. At the center of the inner tube is an annular rib or flange 14 which serves to properly space the two tubes and maintain them in concentric relation and also constitutes a partition between the two series of vents 11 extending circumferentially around the outer tube. At the ends of the inner tube are annular ribs or flanges 15 which likewise bear against the inner surface of the outer tube and serve as spacers to maintain the relative positions of the two tubes, and through these end ribs or flanges I form longitudinal vents 16 which establish communication between the spaces 17 between the two tubes and the space 18 between the end of the inner tube and the caps 12. The space 17 will be packed with a suitable gas-cooling agent and the action of the device, when a fuse blows, will be the same as in the previously described form, the generated gases passing to the ends of the inner tube and then turning back through the openings 16 into the annular spaces or chambers 17 and eventually escaping through the vents 11 in the outer tube.

My improved casing is exceedingly simple and inexpensive and will be found highly efficient when in use for the purpose for which it is designed.

Having thus described the invention, what is claimed as new is:

1. A casing for fuses having a central bore open at its ends and provided with annular chambers in its end portions, the wall of the casing having portions extending beyond the said annular chambers and the inner bore of the casing to receive end caps whereby to establish communication between the said annular chambers and the said bore, and lateral vents leading from said annular chambers to the outer air.

2. A double-walled casing for fuses provided with spaced vents through its outer wall spaced from the ends thereof, and an annular partition separating said vents and extending between the inner and outer walls of the casing whereby annular chambers are provided in the end portions of the casing.

3. A double-walled casing for electrical fuses having its outer wall extending longitudinally beyond its inner wall and provided with vents leading through its outer wall from the space between the two walls, and a partition filling the space between the walls and disposed between the vents through the outer wall whereby annular chambers are produced in the end portions of the casing between the walls.

In testimony whereof I affix my signature.

JOHN G. CLEMENS. [L. S.]