F. D. REYNOLDS & J. SACHS.

SAFETY FUSE.

APPLICATION FILED APR. 17, 1906.

901,261. **Patented Oct. 13, 1908.**

Fig. 1.

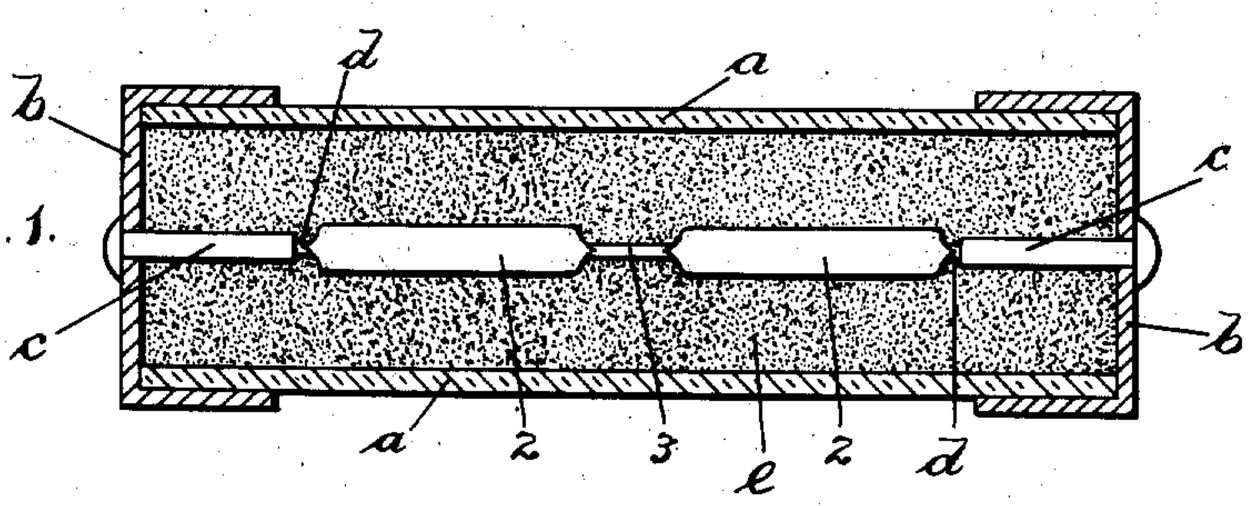
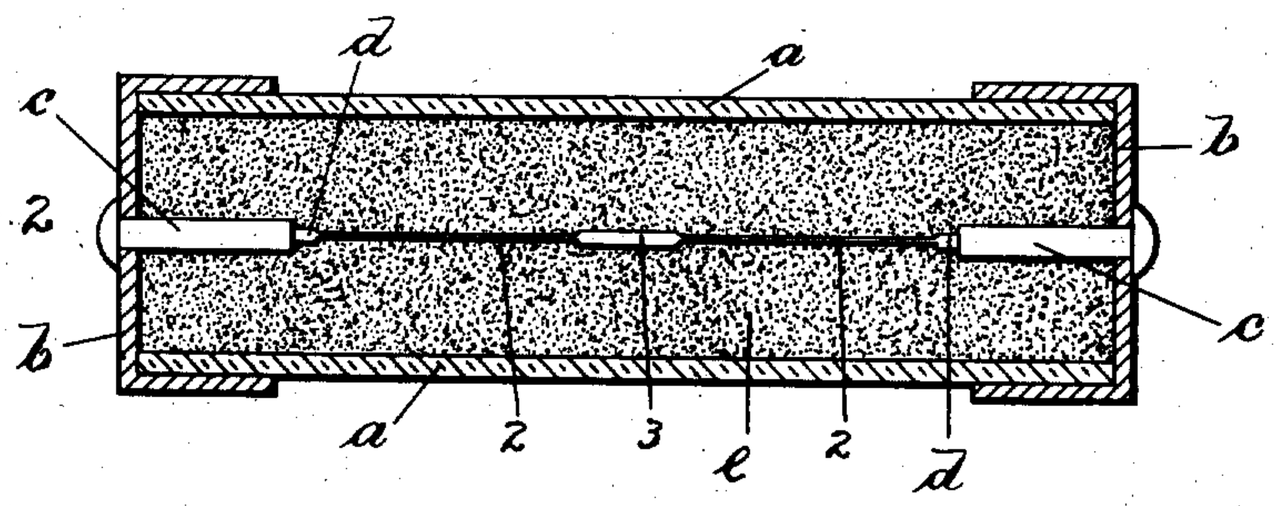


Fig. 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

FRANK D. REYNOLDS AND JOSEPH SACHS, OF HARTFORD, CONNECTICUT, ASSIGNORS TO THE SACHS COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF CONNECTICUT.

SAFETY-FUSE.

No. 901,261. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed April 17, 1906. Serial No. 312,098.

To all whom it may concern:

Be it known that we, FRANK D. REYNOLDS and JOSEPH SACHS, both citizens of the United States, and residents of Hartford, in the county of Hartford and State of Connecticut, have invented an Improvement in Safety-Fuses, of which the following is a specification.

Our invention relates to that class of safety fuses known as inclosed fuses in which a fusible conductor is incased within a suitable tube and surrounded by a non-conducting filling material. Heretofore the fusible conductor employed in these fuses has commonly been one of even cross section throughout its length, and which when carrying an excess current, frequently remains hanging in a molten condition and consequently has not properly broken the circuit, and thereby the fuse device is rendered inaccurate and unreliable. The maintenance of the fusible conductor in this molten condition is due to the fact that the fuse strip being made of lead, tin, zinc, or a similar metal, or alloys of the same, is covered by an oxid and is also closely surrounded by the insulating material filling the tube so that the molten metal has no opportunity to flow, and at times this so-called hanging condition continues until the volatilizing temperature is reached and causes the burning of the fuse tube.

The object of our invention is to provide a means whereby the rupture of the fuse strip or conductor is insured as soon as a desired portion of the same has attained a molten condition and in order to accomplish this result we so construct the fuse strip as to cause the heat generated therein, by the passage of the current, to be concentrated at some particular portion of the fuse strip where the rupture is desired—preferably the center.

In carrying out our present invention, the desired result is obtained by diminishing the heat radiating properties of the fuse strip at the rupture point, or rather increasing heat radiating properties of the fuse strip at all points except the rupture point and to this end we employ a tube or casing, terminals or end caps, therefore, a fuse strip electrically connected to the end caps and provided with flattened portions similarly placed on either side of the central rupture portion, and a filling of insulating material surrounding the fuse strip within the tube, as will be hereinafter more particularly described.

In the drawing Figure 1 is a central longitudinal section of a safety fuse illustrating our present invention, and Fig. 2 is a similar view taken at right angles to that shown in Fig. 1.

a designates a tube or casing preferably made of insulating material, and *b b* are metallic end caps or terminals fitting over the respective ends of the tube *a* and having electrically connected thereto the fuse strip terminals *c c*.

d designates a conductor or fuse strip of lead, tin, zinc, or other fusible material or an alloy of the same, extending between and electrically connected to the fuse strip terminals *c c*. This fuse strip *d* is originally of uniform and preferably circular cross section throughout its length and after the respective ends thereof have been electrically connected to the terminals *c* the strip is placed in a press or other equivalent device to produce the flattened portions 2 similarly placed with reference to the central or rupture portion 3 which retains its original cross-section. We also employ an insulating material *e* surrounding the fuse strip *d* and filling the tube *a*.

Now as is generally known the heat generated in a conductor varies inversely as the cross section and directly as the length, and consequently, if the cross section is constant the heat generated per unit of length is constant, and also that the heat radiated per unit of length will vary directly with the exposed surface per unit of length. Now the fuse strip *d* being originally uniform in cross section is changed to one of even cross section by being provided with the flattened portions 2, the area of any section being unchanged, as is also the amount of metal per unit of length. It will be apparent however, that the flattened portions 2 present a much greater radiating surface than the central rupture portion 3 and as the heat generated per unit of length is constant, the heat generated in the central portion 3 will be radiated less rapidly from this portion than from the flattened portions 2, or in other words, the heat generated is concentrated in the central portion 3 in which consequently the rupture of the strip is thereby effected, before the other portions of the fuse strip reach a molten and

therefore possible hanging condition. We also find that the more or less abrupt change in the section of the fuse strip tends to assist in the rupture thereof at the desired point.

We claim as our invention:

1. A safety fuse comprising terminals, and a fuse strip having a rupture portion and adjacent portions of substantially the same cross section as and of greater heat radiating surface than the said rupture portion.

2. A safety fuse comprising a tube, terminals therefor, and a fuse strip electrically connected to said terminals and having a central rupture portion and adjacent portions of the same cross section as and greater heat radiating surface than the said central rupture portion.

3. A safety fuse comprising a tube, end caps therefor, and a fuse strip electrically connected to said end caps and having a central rupture portion and adjacent portions of the same cross section as and greater heat radiating surface than the said central rupture portion.

4. As a new article a fuse strip having a central portion of circular section and adjacent portions of flat section.

5. As a new article a fuse strip having a central rupture portion of circular section, and adjacent portions of flat section both sections being of substantially the same sectional area.

6. A safety fuse comprising a tube, terminals, a fuse strip having a central portion of circular section and adjacent portions of flat section, and a filling material within said tube.

7. A safety fuse comprising a tube, terminals, a fuse strip having a central rupture portion of circular section, and adjacent portions of flat section both sections being of substantially the same sectional area, and a filling material within said tube.

Signed by us this seventh day of April 1906.

FRANK D. REYNOLDS.
JOSEPH SACHS.

Witnesses:
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