

No. 636,578.

Patented Nov. 7, 1899.

C. P. STEINMETZ.
THERMAL CUT-OUT.

(Application filed Aug. 7, 1899.)

(No Model.)

Fig. 1.

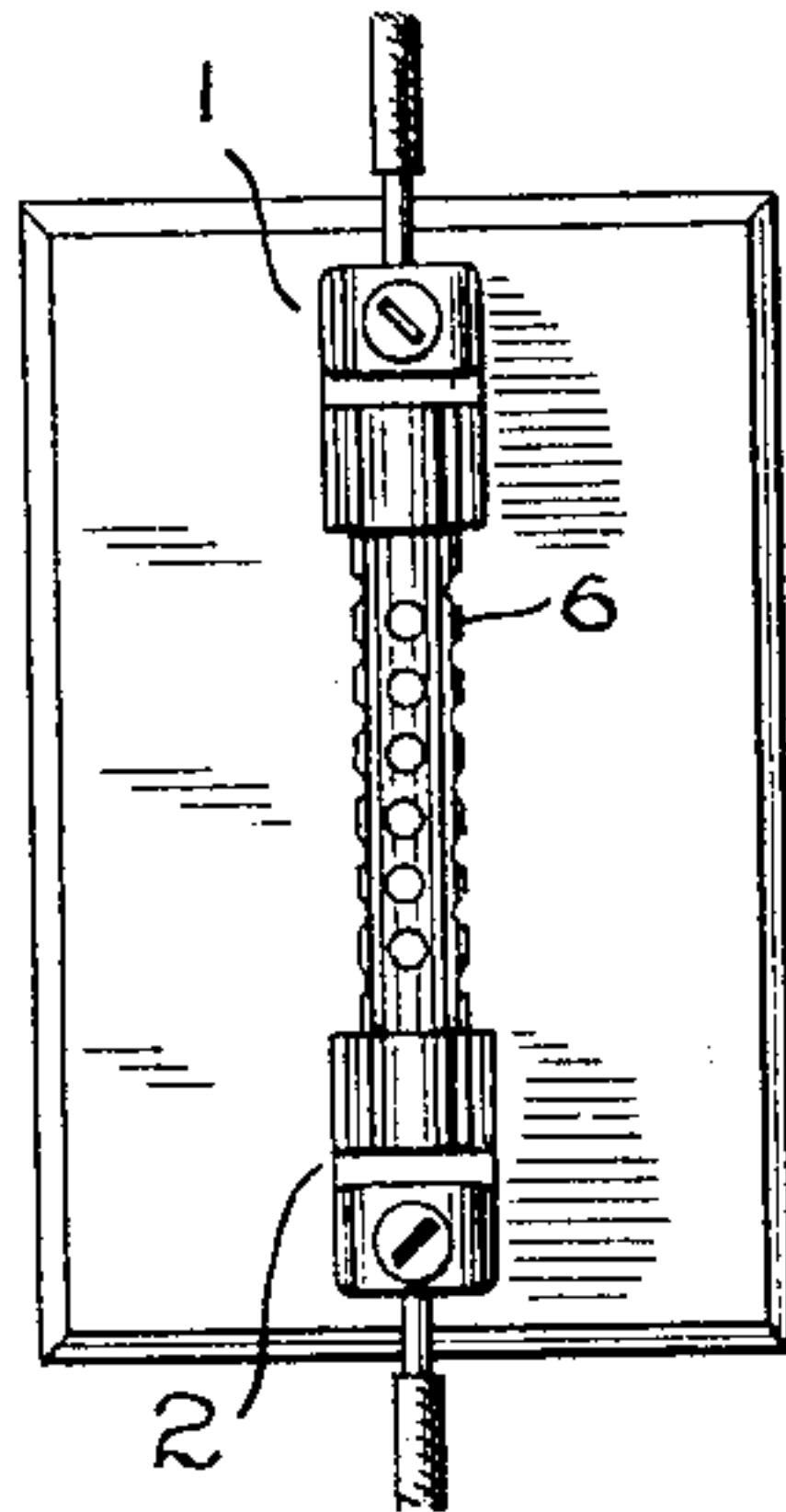


Fig. 2.

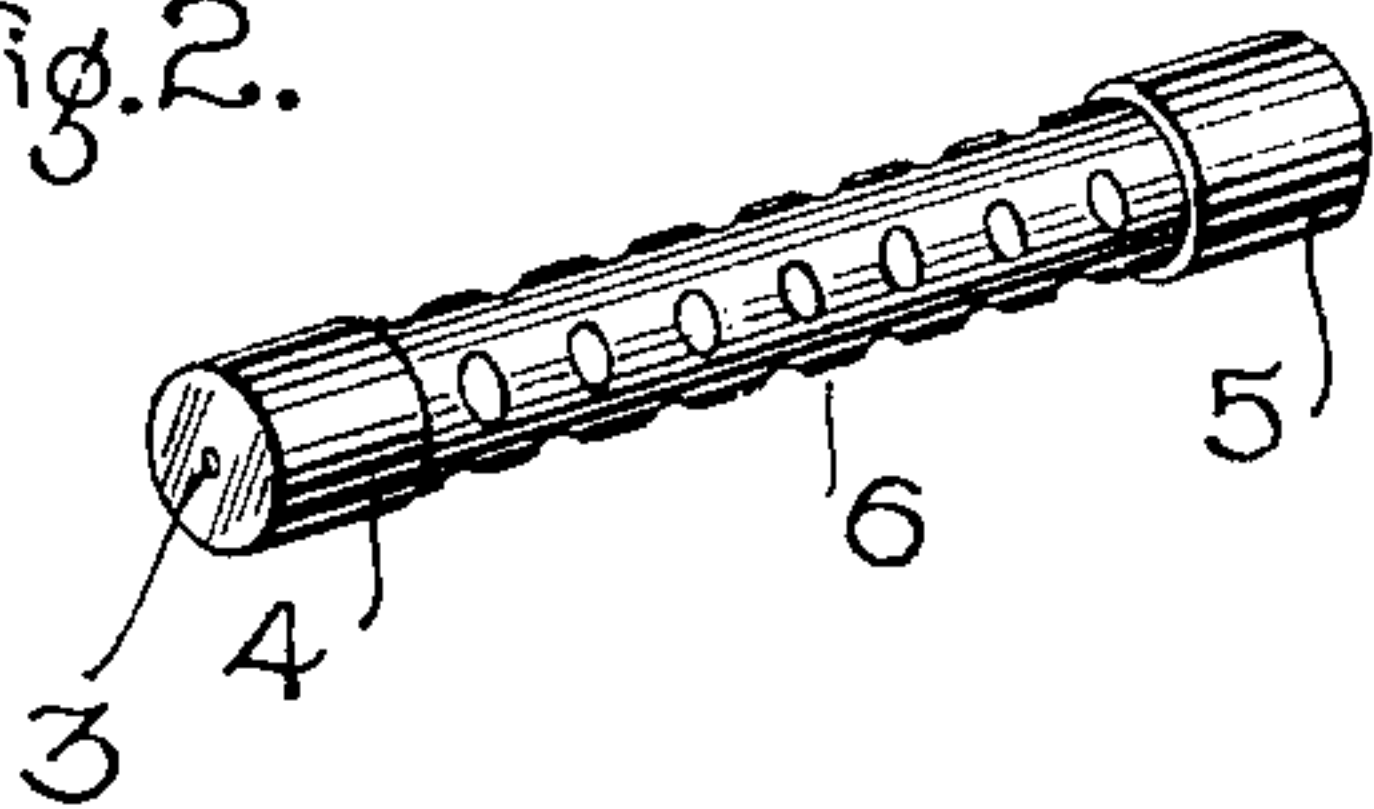


Fig. 3.

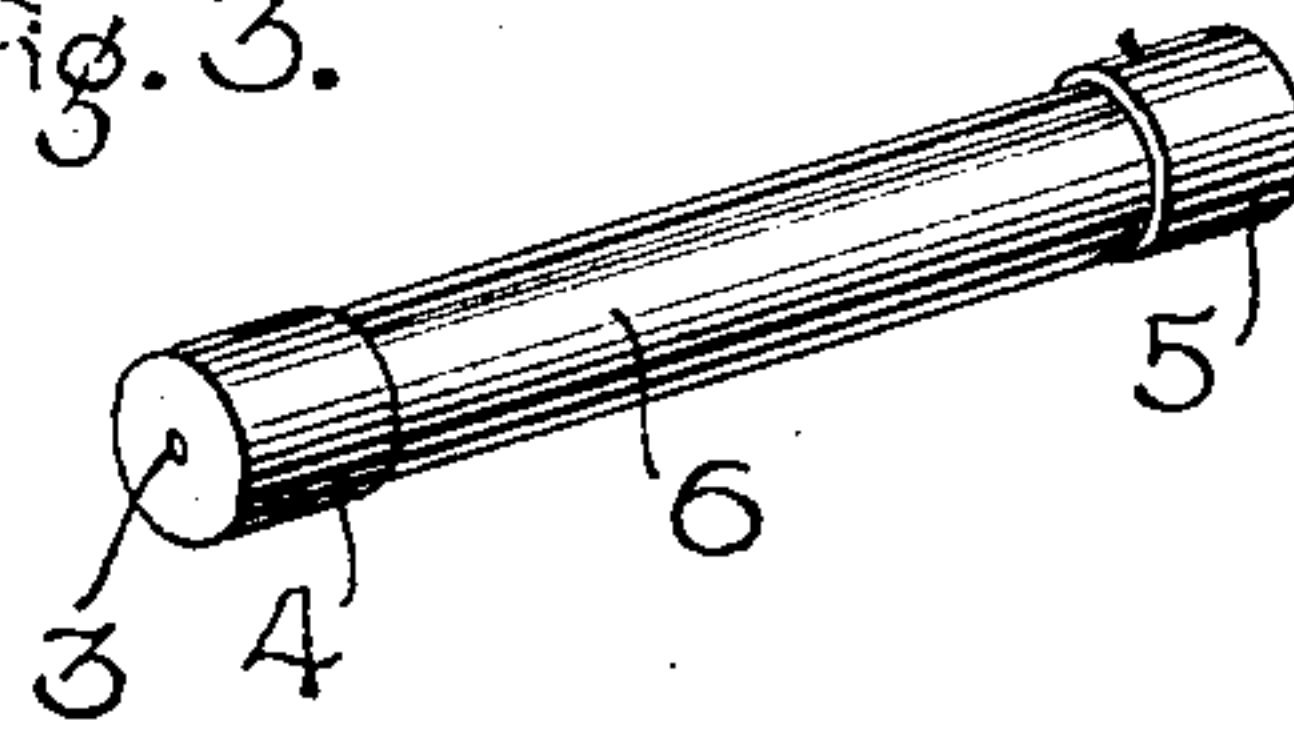


Fig. 4.

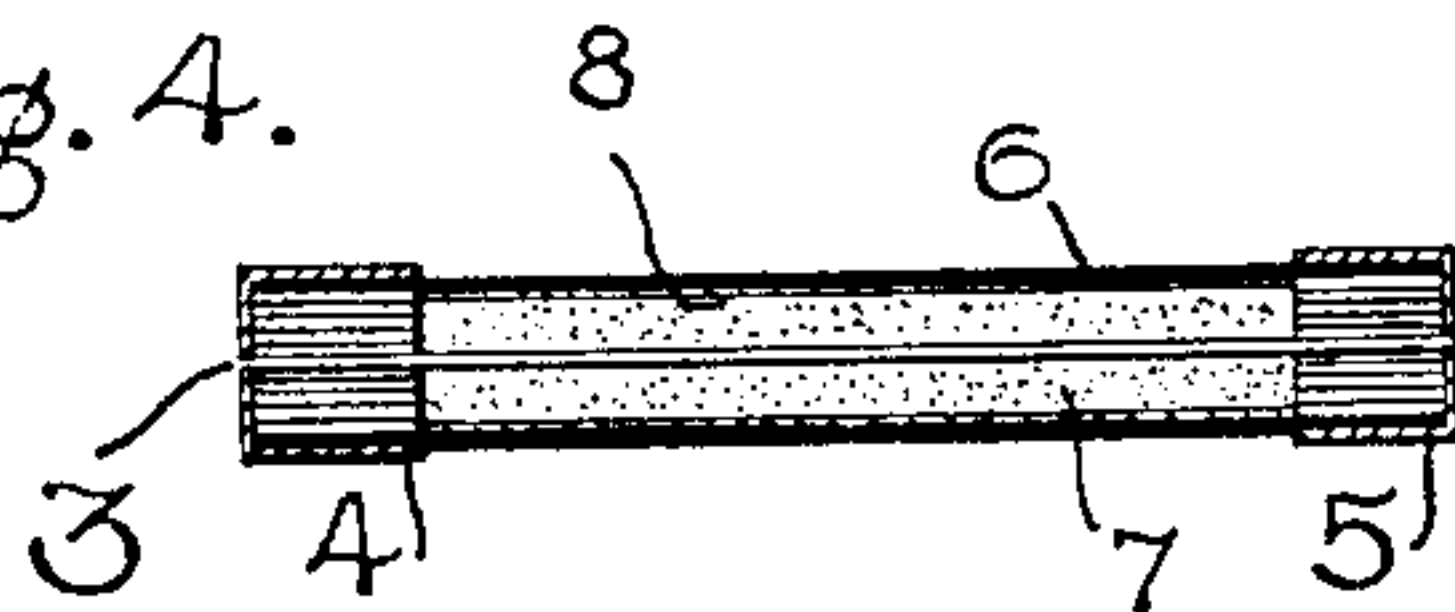
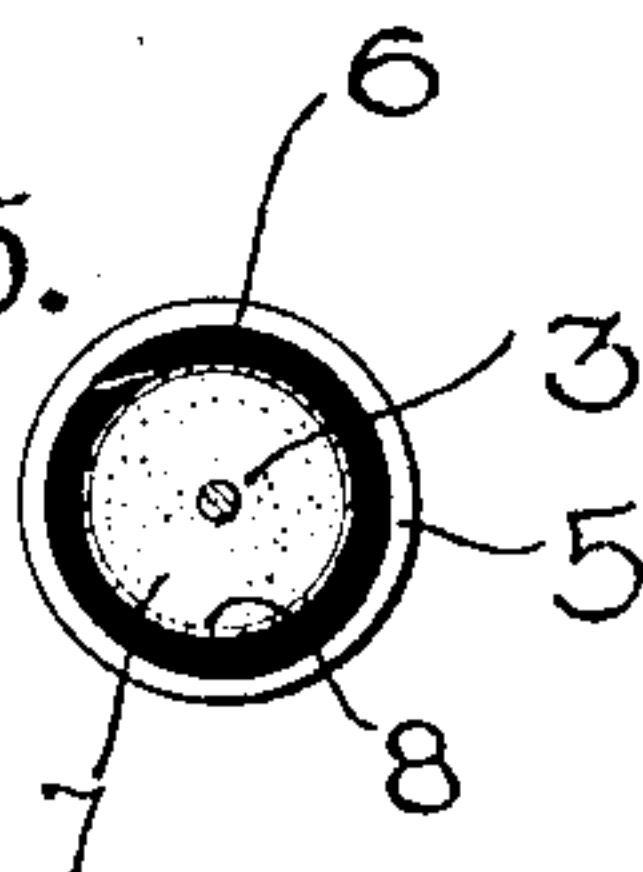


Fig. 5.



Witnesses:
Edward Williams, Jr.
Lewis H. Weil

Inventor:
Charles P. Steinmetz,
by *Albert S. Davis*
Atty.

UNITED STATES PATENT OFFICE.

CHARLES P. STEINMETZ, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE
GENERAL ELECTRIC COMPANY, OF NEW YORK.

THERMAL CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 636,578, dated November 7, 1899.

Application filed August 7, 1899. Serial No. 726,381. (No model.)

To all whom it may concern:

Be it known that I, CHARLES P. STEINMETZ, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Thermal Cut-Outs, (Case No. 1,142,) of which the following is a specification.

This invention relates to automatic circuit interrupters or cut-outs. In devices of this kind employed with high potential currents it is necessary to produce a sudden interruption of the arc formed by the action of the cut-out in opening the circuit in order to prevent injury to the circuit-terminals. A common provision is to insert in the circuit a fuse with a spot of low conductivity at a point distant from either terminal at which the fuse will first give way and create by some auxiliary means an expulsive action on the arc by which when the fuse blows it will be extinguished, thereby interrupting the circuit before the terminals have been damaged. My invention relates generally to this type of devices, though it is not necessary that a fusible interrupter should be employed, as the expulsive means I employ to extinguish the arc are dependent only upon a rise of temperature in the cut-out device, upon which an explosive material is raised to a reacting temperature and the circuit interrupted.

In the specific form herein set forth my invention comprises the employment of a metallic acetylide. Certain compounds of acetylene with metals when dried explode at very low temperatures. For example, cupric acetylide ($C_2CU_2 \times H_2O$) when dried explodes at a heat of from 100° to 120° centigrade, leaving a residue of black powder containing charcoal and copper. So also silver acetylide and gold acetylide explode at low temperatures. I employ a body of one of these compounds in such relation to a conductor inserted in the circuit to be interrupted that when the conductor carries an excessively large current it will heat sufficiently to explode the compound, the explosion destroying a part of the conductor and violently interrupting the arc, which forms at the instant of circuit rupture.

The best mode of carrying out my invention is to inclose a conducting-wire of such

current-carrying capacity that it will heat upon carrying an excessive current for the circuit in which it is installed within a fragile tube containing an explosive acetylide. The tube may be provided with openings and lined with a thin material which will easily give way, the result being that upon the sudden accumulation of pressure due to the explosion the conductor is ruptured or destroyed and the arc extinguished by being blown through the openings or outwardly from the tube if the latter be shattered.

The features of novelty of my invention will be more particularly described herein-after and will be definitely indicated in the claims appended to this specification.

In the drawings, which illustrate several embodiments of my invention, Figure 1 is a view illustrating a thermal cut-out inclosed within a perforated tube containing a portion of the explosive compound. Fig. 2 is a perspective view of such a device. Fig. 3 is a modification in which a fragile tube without perforations is employed. Fig. 4 is a longitudinal sectional view of such a tube, and Fig. 5 is a cross-sectional view.

1 and 2 represent the terminals of an electric circuit, between which may be inserted a cut-out such as hereinabove referred to. This comprises a conductor, which may be a wire, easily-fusible wire or not, as shown at 3, secured in conductive relation to two end caps of metal 4 5, slipped over the ends of the fragile tube 6. The latter may be made of fiber, pasteboard, or other material which will afford sufficient stiffness for ordinary service and will at the same time be a non-conductor of electricity. The tube may be filled around the conductor with an explosive acetylide compound, as indicated at 7, or the conductor may be coated with this compound and held in place by any suitable vehicle. The compound may be handled with perfect safety when wet; but when dry, in which condition it still contains its water of crystallization, as its formula indicates, is highly explosive on percussion or when raised to a comparatively moderate temperature. I preferably dry it carefully before introducing it into the tube, and the latter may be lined with thin paper, as indicated at 8, and particularly so if perforated,

as in the design shown in Figs. 1 and 2. As thus organized it will be evident that upon an excessive current traversing the conductor between the cut-out terminals the latter will
5 heat, and on attaining a temperature which may be considerably below fusion and much below red heat or the point of reaction for ordinary explosives will explode the acetylide and rupture the circuit. The reaction is ef-
10 fected without the accompaniment of any noxious gases. If desired, the conductor may be provided with a weak spot of low current-carrying capacity, the explosive being placed at the sides, where the arc will spread after
15 the fuse blows. The action in such a case will be to permit an arc to form and then blow it out and shatter the fuse ends by the explosive compound.

What I claim as new, and desire to secure
20 by Letters Patent of the United States, is—

1. An electric cut-out, comprising a conductor adapted to heat under a predetermined strength of current, and a body of an explosive acetylide compound in heat-conductive
25 relation to the conductor.

2. An electric cut-out comprising a conductor adapted to heat under a predetermined strength of current, and a body of acetylide of copper in heat-conductive relation to the con-
30 ductor.

3. An electric cut-out comprising a conducting-wire adapted to be connected to the terminals of the circuit and to heat under excessive current in said circuit, a casing around said conductor, and an explosive acetylide be- 35
tween the conductor and casing.

4. An electric cut-out comprising a closed fragile tube provided with conducting ends between which is inserted a wire adapted to heat under excessive current in the circuit in 40
which it is placed, and a body of acetylide of copper between the conductor and the tube.

5. A cut-out for an electric circuit comprising a perforated tube containing a thin electric conductor adapted to be connected to two 45
circuit-terminals, and a body of acetylide of copper in heat-conductive relation to the conductor.

6. A cut-out for an electric circuit, comprising a perforated tube, a thin lining therefor, 50
a thin electric conductor within the tube, adapted to be connected in an electric circuit, and a body of acetylide of copper between the conductor and the lining.

In witness whereof I have hereunto set my 55
hand this 4th day of August, 1899.

CHARLES P. STEINMETZ.

Witnesses:

BENJAMIN B. HULL,
MABEL E. JACOBSON.