

No. 657,414.

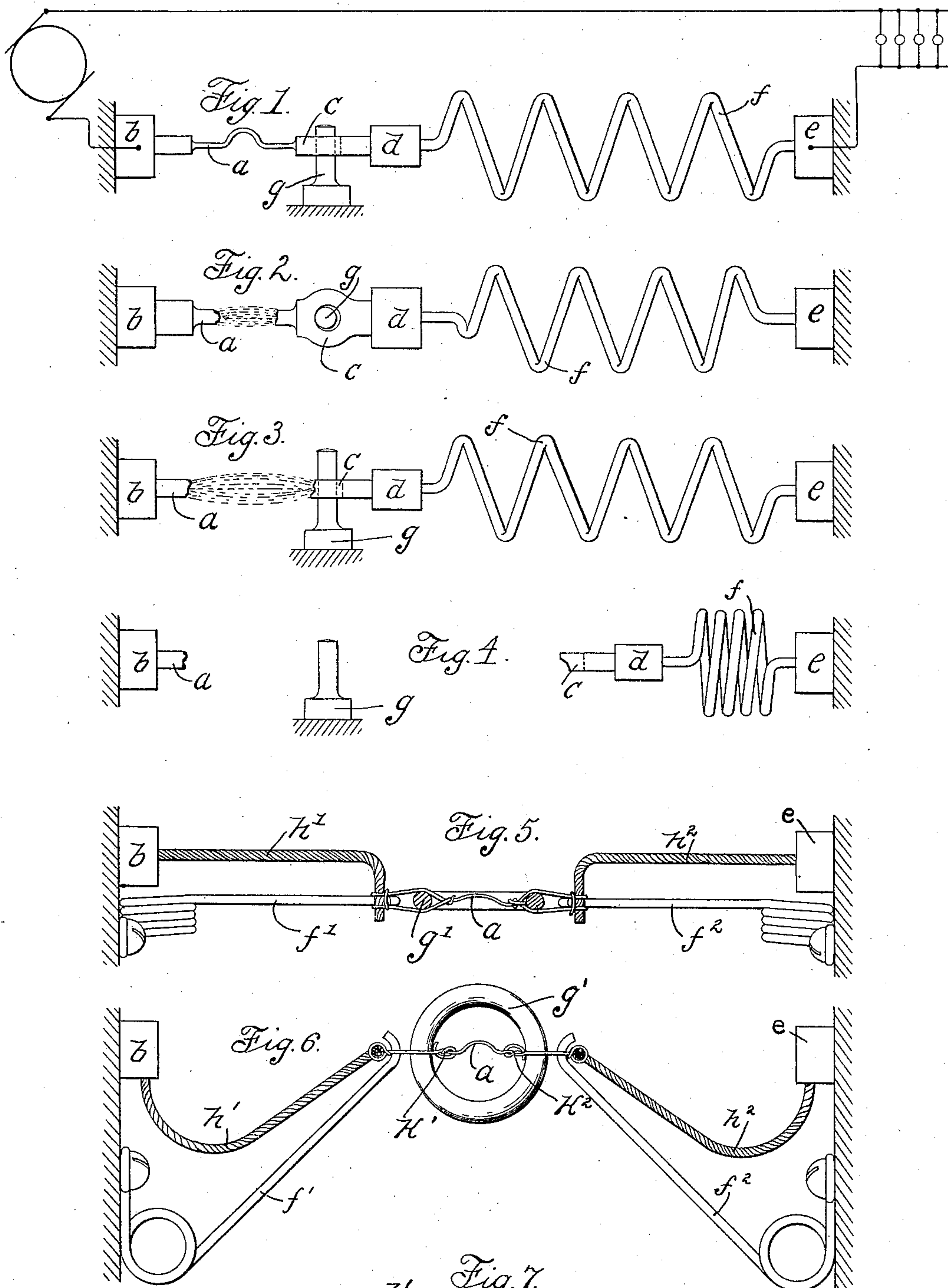
Patented Sept. 4, 1900.

R. HUNDHAUSEN.

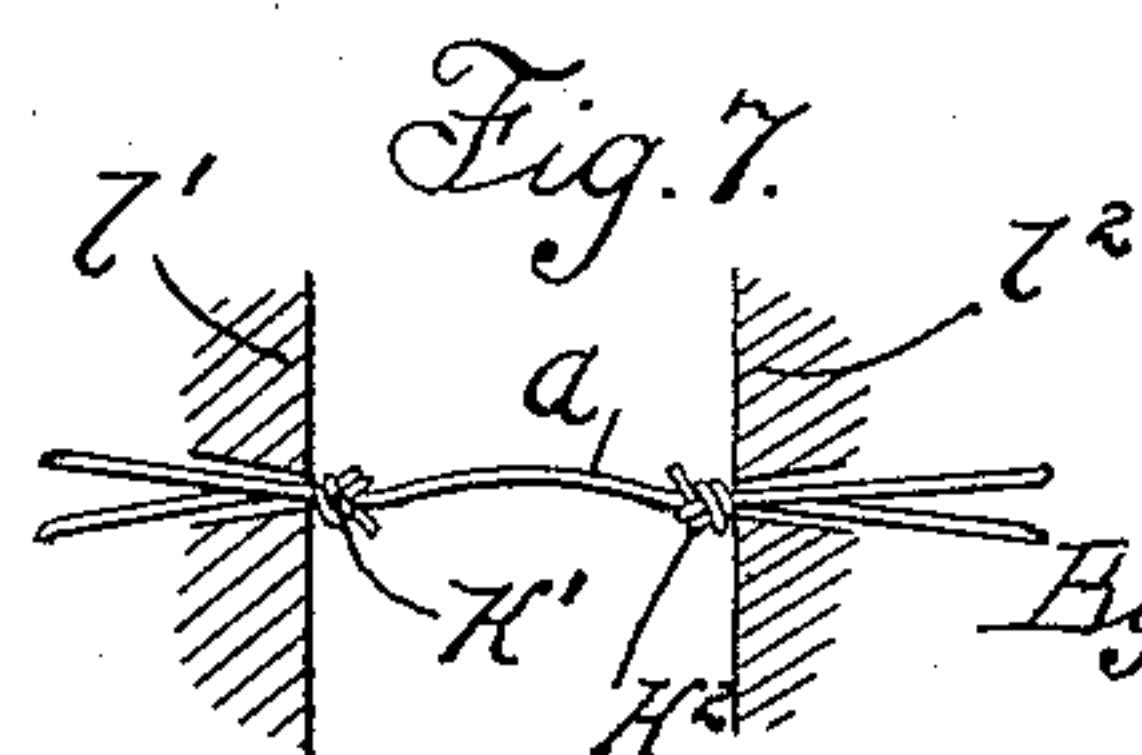
FUSE.

(Application filed Nov. 18, 1899.)

(No Model.)



Witnesses:
Max Label.
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UNITED STATES PATENT OFFICE.

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FUSE.

SPECIFICATION forming part of Letters Patent No. 657,414, dated September 4, 1900.

Application filed November 18, 1899. Serial No. 737,445. (No model.)

To all whom it may concern:

Be it known that I, RUDOLF HUNDHAUSEN, a subject of the Emperor of Germany, residing at Wilmersdorf, near Berlin, Germany, have invented a certain new and useful Improvement in Fuses, (Case No. 256,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to fuses, and has for its object the provision of improved means whereby the terminals of a ruptured fuse may be speedily separated.

In the application of fuses as safeguards for electric circuits it is essential that the power consumed therein be as small as possible and also that the drop of potential caused therein be minimized. The rupture of fuses is accompanied frequently by an arc, which extends from one terminal to the other and persists after the fuse has been melted away. In order to reduce the lengths of strips of fuse-wire, it is necessary that the terminals of the ruptured fuse be mechanically separated in order that the arc formed between them may be extinguished. Means for accomplishing this object have been devised in the form of cement bodies, which melt under the influence of the heat of the current and interrupt the arc by separating the terminals of the ruptured fuse. In this method, however, the fuse is always under tension and therefore cannot be considered a reliable safeguard for the circuit.

The prime object of the present invention is to provide a means whereby the main portion of the fuse is in its natural condition and not subject to any mechanical strain.

Generally speaking, my invention provides a means wherein the actual safeguard against the maintenance of the arc does not reside in the mechanical structure of the fuse, but in a portion in secondary relation to the fuse. By this means any tension upon the fuse normally is avoided and the fuse will always be reliable.

I will describe my invention more particularly by reference to the accompanying drawings, in which—

Figure 1 is a side view of an embodiment of my invention. Fig. 2 is a top view thereof. Fig. 3 is a side view, the fuse being ruptured. Fig. 4 is a side view with the terminals of the fuse separated. Figs. 5 and 6 are side and top views, respectively, of another embodiment of my invention. Fig. 7 is a side view illustrating the application of fuse-wire.

Like letters of reference indicate like parts in the different views.

Referring now to Fig. 1, the fuse *a* is united to one terminal *b* of a circuit. The free end of the fuse consists of an enlarged portion or loop *c*, which is mechanically united to another terminal *d*, which is in electrical communication with the terminal *e* of the circuit through a spring *f*. The loop portion *c* of the fuse is placed over a projecting arm *g*, against which the force of the spring *f* acts. If the current in the circuit increases abnormally, the fuse *a* is ruptured, as shown in Fig. 2. An arc is formed, the heat caused thereby being sufficient to melt neighboring portions of the fuse, thereby increasing the space over which the arc must be sustained. If this increased space, however, is not sufficient to break the arc, the loop *c* of the fuse will also be melted by the heat, as shown in Fig. 3. When this loop *c* is melted a sufficient distance, the spring *f* acts, thereby speedily separating the terminals *b* and *d* and readily interrupting the arc. This is clearly shown in Fig. 4. The wave-like form of the fuse *a*, as shown in Fig. 1, shows that no tension is exerted thereon by the spring *f*, and therefore the weakest portion of the fuse *a* is always a reliable safeguard to the system. I am thereby enabled to use very short lengths of fuse-wire, as the mechanical means employed separate the terminals upon rupture, and I am also enabled to use a fuse-wire of small cross-section, as the tension of the spring acting on the free terminal is not transmitted to the main portion of the fuse. Both ends of the fuse may, however, be movably mounted, in which case a ring or frame *g'* may be employed, as shown in Fig. 5. At its terminals the fuse *a* may be preferably doubled and passed over the sides of a supporting-frame *g'*, it being then secured to springs *f'* and *f''*. In order

not to include the springs in the circuit, I preferably employ flexible conductors h' and h^2 , over which the terminals of the fuse may be wound. These flexible conductors h' and h^2 are included in the circuit at b and e . The supports must be stationarily mounted or fixed with relation to each other, and I preferably employ a porcelain ring, as shown in Fig. 6, for supporting both terminals of the fuse. The doubled portions of the fuse serve to transmit the tension of the springs f' and f^2 to the porcelain ring, the main portion of the fuse a being devoid of tension. A rupture of the fuse a will necessitate a melting of the knotted portions k' k^2 , thereby permitting the springs f' f^2 to act and speedily separate the terminals of flexible conductors h' and h^2 a sufficient distance positively to interrupt the arc.

A simple means for the employment of fuse-wire consists in passing the fuse-wire through apertures in insulated portions l' l^2 , knotted portions k' k^2 of the fuse being provided to prevent a tension being exerted on the main portions thereof. A rupture of the fuse will be accompanied by the melting of the knotted portions k' k^2 , thereby permitting the terminals of the fuse to be drawn through the apertures, positively interrupting the circuit.

I have herein shown and particularly described the preferred embodiments of my invention; but I do not wish to be limited to the precise construction shown; but,

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with a fuse portion, of a tension device adapted for separating the terminals of the said fuse portion upon rupture, a second fuse portion in secondary relation with the said fuse portion, and a support associated with the second fuse portion for receiving the tension due to the said tension device, the weakest portion of the said fuse portion being thereby relieved of tension, substantially as described.

2. The combination with a fuse portion, of a second fuse portion of increased cross-section, a support associated with said second fuse portion, and a tension device adapted for connection with the second fuse portion for separating the terminals of the fuse upon rupture, substantially as described.

3. The combination with a fuse portion, one terminal of which is adapted for connection with one terminal of a circuit, of a second

fuse portion electrically united to said fuse portion, a support associated with the second fuse portion normally in fixed relation to the first aforesaid fuse portion, and a tension device for separating the terminals of the fuse upon rupture, substantially as described.

4. The combination with a fuse portion, the terminals of the said fuse portion being knotted, of supporting means against which said knotted portions are adapted to rest, and tension devices associated with the knotted portions of the said fuse for separating the terminals of the said fuse upon rupture, the main portion of the said fuse being relieved of tension, substantially as described.

5. The combination with a fuse portion, the terminals of the said fuse portion being of increased cross-section, of a supporting means against which said portions of increased cross-section are adapted to rest, flexible terminals in electrical communication with the said terminals of the fuse portion, and tension devices associated with the said terminals for separating the said terminals upon the rupture of the fuse, substantially as described.

6. The combination with a fuse portion, the terminals of the said fuse portion being of increased cross-section, of a supporting-frame against which said portions of increased cross-section are adapted to rest, flexible terminals in electrical communication with the said terminals of the fuse portion, and tension devices associated with the said terminals for separating the said terminals upon the rupture of the fuse, substantially as described.

7. The combination with a fuse, of a spring-retractor therefor, and a fixed support normally relieving the fuse of strain, the retractor being freed when the arc extends a determinate amount.

8. The combination with a fuse portion suitably secured in position, of tension means for separating the terminals of the said fuse upon rupture, and means for normally preventing the tension means from exerting tension upon the fuse portion, substantially as described.

9. An electric fuse normally connecting circuit-terminals without being strained, and means controlled by the arc when the fuse blows for rapidly separating the terminals.

In witness whereof I hereunto subscribe my name this 10th day of October, A. D. 1899.

RUDOLF HUNDHAUSEN.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.