No. 751,012. PATENTED FEB. 2, 1904.

R. H. READ.

FUSE BOX.

APPLICATION FILED APR. 1, 1901.

NO MODEL.

Fig. 1.

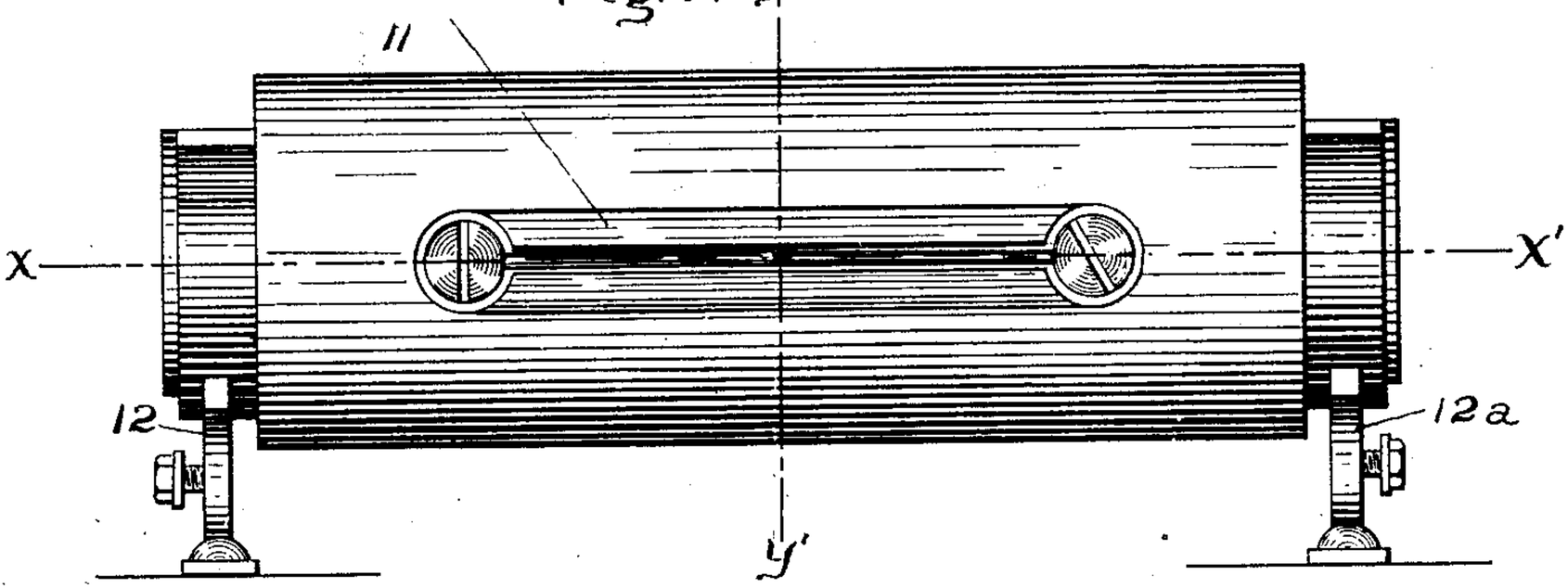


Fig. 2.

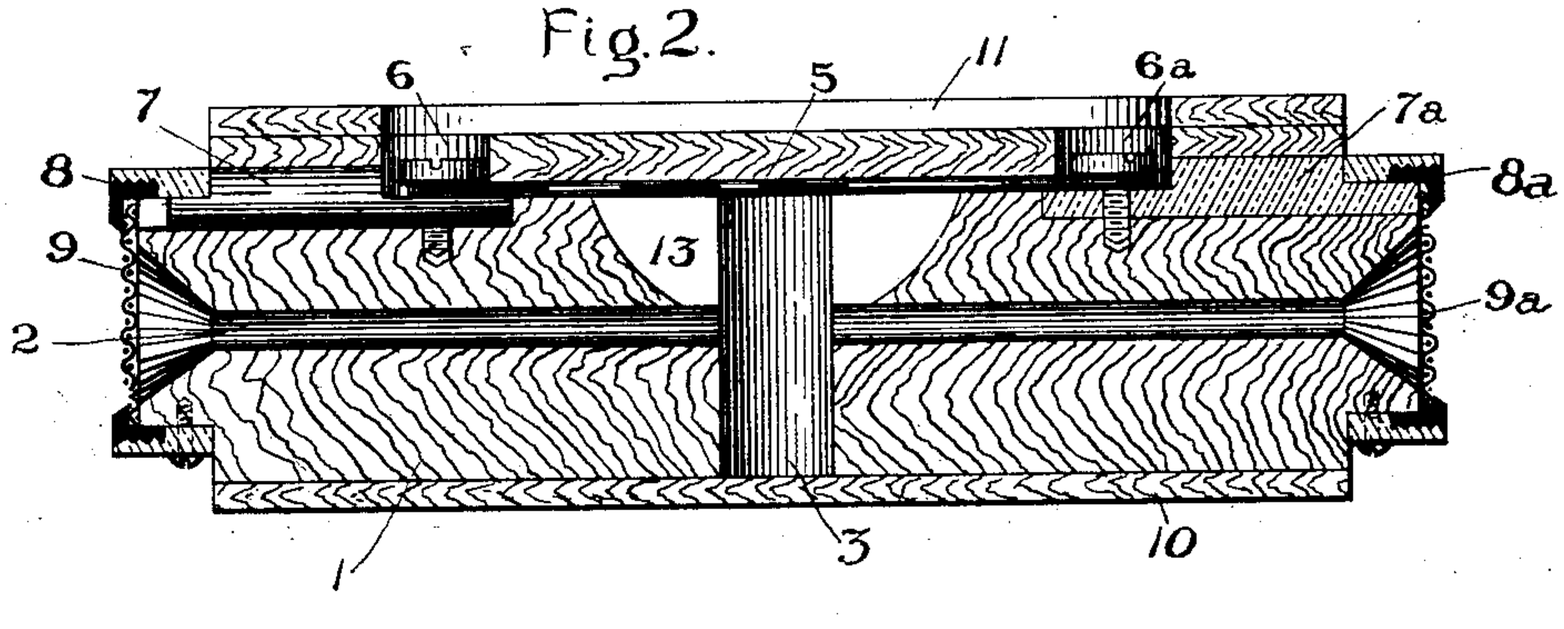


Fig. 3

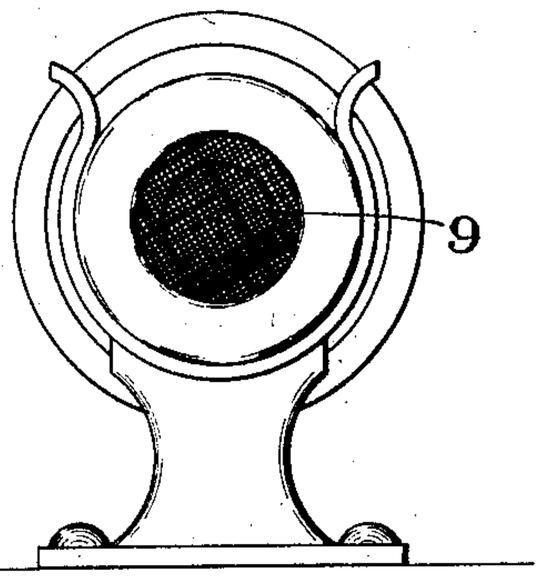
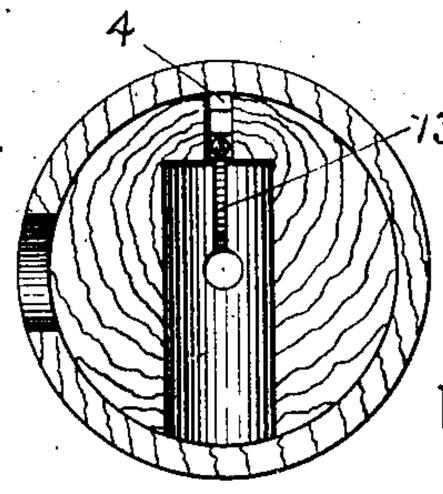


Fig. 4.



Witnesses.
Benjamin B. Hull,
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Inventor.
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Atty.

No. 751,012. Patented February 2, 1904.

UNITED STATES PATENT OFFICE.

ROBERT H. READ, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

FUSE-BOX.

SPECIFICATION forming part of Letters Patent No. 751,012, dated February 2, 1904.

Application filed April 1, 1901. Serial No. 53,879. (No model.)

To all whom it may concern:

Be it known that I, ROBERT H. READ, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Fuse-Boxes, of which the following is a specification.

This invention relates to electric fuse-boxes, the object being to provide a device of this character for opening an electric circuit of small size and relatively large capacity which will safely and quietly open a circuit and will rob the volatilized fuse metal of its heat, so as to throw little or no flame from the box, and will trap the condensed fuse metal, so as to prevent throwing hot metal.

In carrying out the invention I mount the fuse in an insulating-container in a groove in which there is but little clearance, placing at a suitable point in the length of the fuse an opening in the wall of the box which communicates with discharge-paths for the volatilized gases of suitable length and small dimensions, so as to permit the hot gases to part with their heat in transit, and over the points of discharge to the atmosphere I mount a porous or perforated heat-conducting material along which the hot gases must pass before reaching the atmosphere. The paths of discharge are preferably placed at an angle to the line in which the fuse metal is first driven when the fuse blows, and at the point where the discharged gases change direction I place a trap into which the melted and volatilized portions of the fuse or such parts thereof as have been volatilized and become condensed may be received. Over the slot in which the fuse is held I place a removable cover by which the fuse-chamber may be closed, except for the paths of discharge already described, after being connected in circuit. I preferably employ for this purpose a tubular casing over the fuse-box, which may be rotated, a slot in the same being adapted to be shifted into or out of line with the fuse, thereby exposing the fuse-terminals and permitting a new fuse to be inserted in the box and by an angular shifting of the cover to form a substantially air-tight inclosure for the fuse, except through the desired paths of discharge when it blows. The bottom of the fuse-slot is cut away at points adjacent to the discharge-point, so as to increase the rapidity of heating at this point with respect to the ends of the fuse. With this organization when an overload occurs the fuse first gives away at a central point between the terminals, the parts immediately adjacent thereto being softened by reason of the decreased area of contact with the box-walls, and the heated air and volatilized metal drives the middle portion of the fuse across the discharge-opening, the unvolatilized parts being driven by reason of their superior weight into the trap already referred to and the heated air and volatilized products being forced around the angular path or paths, in which they are robbed of much of their heat, and finally pass to the outside atmosphere through the chilling devices already referred to. By this means the arc formed at the parted ends of the fuse is stretched out in two directions toward the ends of the fuse-box and snapped, thereby interrupting the arc, and the products of the heat developed by blowing the fuse are cooled off and discharged into the atmosphere.

My invention comprises a fuse-box having a walled opening for the discharge of the products when the fuse blows bent or curved between its termini and a receptacle near the bend to prevent the discharge of the unvolatilized matter.

It comprises also a fuse-box having a foraminous or similar metal or other heat conductor in the path of discharge of the volatilized gases to rob them of their heat.

It comprises also other features, the novelty of which will be pointed out hereinafter and will be definitely indicated in the appended claims.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure 1 is a side elevation of a fuse-box embodying my improvements. Fig. 2 is a longitudinal sectional elevation on a plane indicated by the line $x\,x'$ of Fig. 1. Fig. 3 is an end elevation, and Fig. 4 is a section on a plane indicated by the line $y\,y'$ of Fig. 1.

1 represents a cylindrical block formed of insulating and comparatively non-inflammable material. It may be formed of lignum-vitæ or similar dense wood or of porcelain, soapstone, or similar refractory insulator. The block is bored longitudinally with a small passage 2, the passage being reamed out at the ends, so as to form a flaring opening, as indicated in Fig. 2. Through the under side of the block is bored a larger opening 3, which terminates on a line with the bottom of a narrow slot 4, formed in the top of the block, which is designed to accommodate the fuse-wire 5. This slot will vary in size, according to the capacity of the fuse, being of a width to just easily admit the fuse and of no very great depth, so as to form a fuse-chamber of small capacity. The ends of the slot terminate in enlarged openings 6 6ª, designed to receive the set-screws which secure the fuse to the fuse-terminals. The latter may be formed of cylindrical pieces of brass, as 7 7ª, slipped into holes bored lengthwise of the fuse-block, as indicated in Fig. 2. These terminals may be screwed, soldered, or otherwise secured to metal ferrules 8 8ª, adapted to be crowded over the reduced ends of the fuse-block, anchored in position by set-screws or in any other convenient way. Fiber bushings on these ferrules hold in place against the ends of the block a foraminous heat-conductor, which may be formed of closely-woven iron or copper gauze, as indicated at 9 9ª. Over the outside of the block 1 is a sleeve of insulating material, such as fiber or wood, (indicated at 10.) This sleeve snugly fits the cylindrical block 1, so that by manual effort it may be angularly shifted around the block, and contains a slot 11, which may be shifted into alinement with the fuse-clamps 6 6ª and after the fuse is inserted in the box may be shifted so as to cover the slot which houses the fuse. By shifting the sleeve 10 through one hundred and eighty degrees the slot 11 may be brought into alinement with the opening 3, permitting the removal of the metal trapped in the bottom of this opening. The fuse is supported in metal clips 12 12ª, containing binding-posts, by which connection may be made with a circuit. After being blown the fuse-box may be removed from the terminals and a fuse inserted in place and the box then restored to the spring-clips.

The walls of the groove in which the fuse is placed at a point adjacent to the opening 3 are cut deeper than the parts near the fuse-terminals. This may be effected by a small circular saw deepening the curve near the center of the fuse, as indicated at 13 in Figs. 2 and 4.

It will be evident from the construction described that when the current reaches the limit of the carrying capacity of the fuse the point near the center, being surrounded by air, will give way before the other parts, which have a greater or lesser surface of contact with the walls of the fuse-box. The parts of the fuse resting over the opening 13 will have a mere edge of contact with the box-walls and will therefore heat more quickly than the parts of the fuse near the terminals, which lie on the bottom of the slot. The fuse will therefore give way at the center first, and the heated air and volatilized metal produced by the arc will exert a downward pressure in the opening 3, rapidly accumulating and driving the combined metal and hot gases downwardly. The metal by reason of its momentum is carried onward to the bottom of the opening 3, whereas the gases turn both ways and pass through the small bore 2, being robbed in transit of much of their heat and spread out at the end of the passage and pass through the gauze diaphragms. They are thus discharged at a much lower temperature than is the case with fuses as commonly constructed. All metal is trapped out, most of it being thrown to the bottom of the chamber 3 and the balance caught on the diaphragms 9 9ª. In normal operation almost no flame is evident at the ends of the box.

The sizes of the openings vary with the capacity of the fuse. For a fuse adapted for five-hundred-volt circuits I have found in practice that a fuse about four inches long may be employed with good advantage. The size of the bore 2 may be varied according to the capacity of the fuse. For a thirty-ampere fuse an opening of three-sixteenths of an inch gives excellent results. The size of the fuse-containing slot should be just enough to contain the fuse, and its depth should be about three times its width. For all ordinary overloads the display of fire at the ends of the fuse-box is prevented, and for short-circuits the discharge of melted metal is absolutely prevented and but little flame displayed. For ordinary overloads the arc made by the fuse is put out without noise, though in the case of short circuits or very heavy currents in which most of the body of the fuse is volatilized the arc is extinguished with a report.

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

1. A fuse-box provided with a fuse-chamber communicating at a point between the fuse-terminals with a passage extending from end to end of the box, said passage being enlarged at the discharge-outlets, and a good heat-conductor in communication with each outlet.

2. A fuse-box containing an inclosed fuse, a fuse-chamber having a discharge-vent intersecting a part of the fuse, said vent being divided into a plurality of discharge-paths of small diameter relatively to their length, terminating in enlargements at the points of outlet, and metallic heat-absorbers at said points of outlet.

3. A fuse-box containing a fuse-chamber having an outlet through a bent channel and a trap for metal at or near the bend.

4. A fuse-box containing a fuse-chamber having a passage at a point between the fuse-terminals in a wall of said chamber, and a plurality of discharge-outlets communicating with the passage at a point between its ends.

5. A fuse-box containing a fuse-slot, a discharge-path for the gases when the fuse blows, and a movable cover to expose or cover the slot by turning relatively to the slot.

6. A fuse-box containing a fuse-slot and having a passage in the fuse-walls at an intermediate point of the slot, a discharge-path for the gases at an angle to the passage between its terminals, and a removable cover for the bottom of the passage.

7. A fuse-box having a fuse-slot, a fuse supported in said slot, and means contiguous to the fuse for graduating the heat-radiating capacity at different parts of its length independently of change in the cross-section of the fuse.

8. A fuse-box having a fuse-chamber in the walls of the box, and a rotatable slotted cover for said chamber.

In witness whereof I have hereunto set my hand this 29th day of March, 1901.

ROBERT H. READ.

Witnesses:
BENJAMIN B. HULL,
FRED RUSS.