No. 720,087. PATENTED FEB. 10, 1903.

T. VAN ALLER.

ELECTRIC FUSE BOX.

APPLICATION FILED MAY 1, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

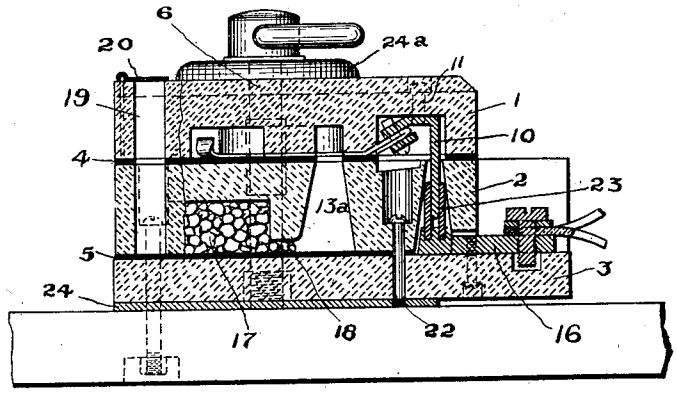


Fig. 2.

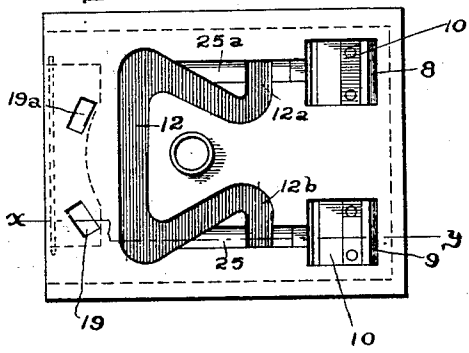


Fig. 3.

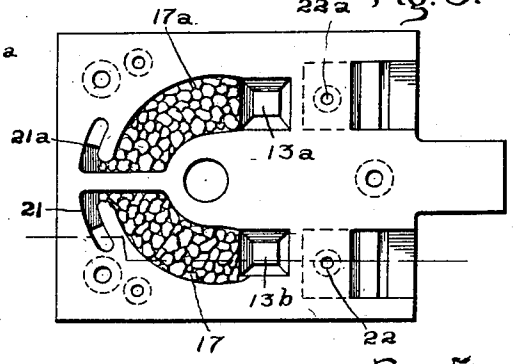


Fig. 4.

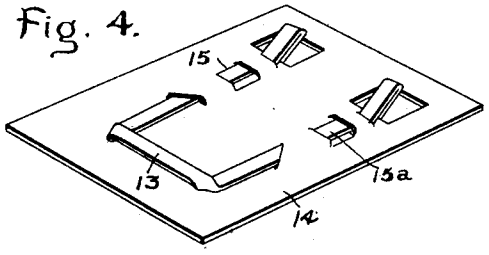
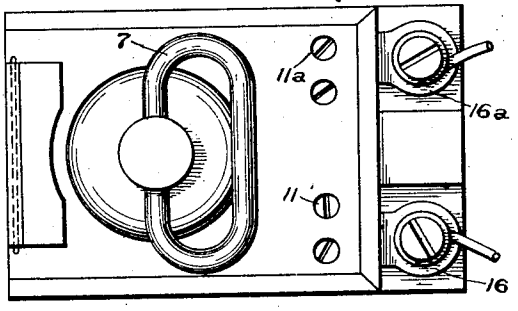


Fig. 5.



Witnesses.

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No. 720,087. PATENTED FEB. 10, 1903.

T. VAN ALLER.

ELECTRIC FUSE BOX.

APPLICATION FILED MAY 1, 1901.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 6.

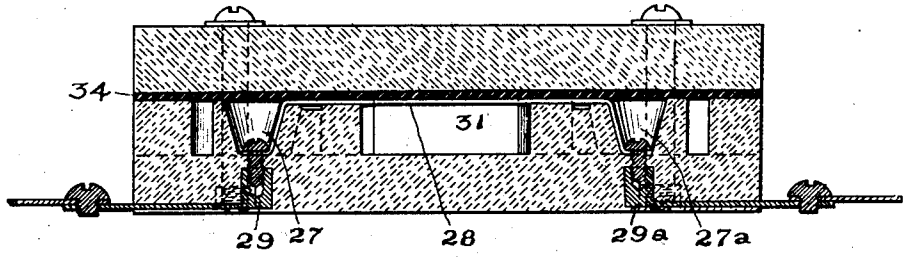
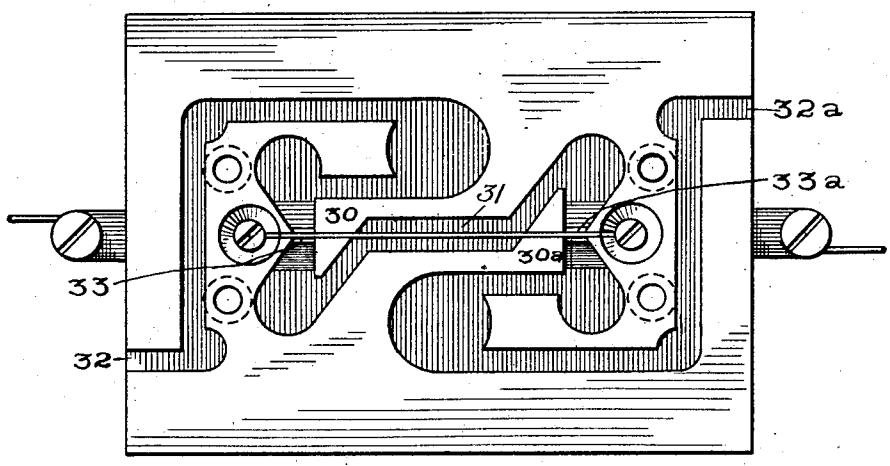


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

TYCHO VAN ALLER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC FUSE-BOX.

SPECIFICATION forming part of Letters Patent No. 720,087, dated February 10, 1903.

Application filed May 1, 1901. Serial No. 58,251. (No model.)

To all whom it may concern:

Be it known that I, TYCHO VAN ALLER, a subject of the King of Denmark, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electric Fuse-Boxes, (Case No. 1,843,) of which the following is a specification.

This invention relates to fusible cut-outs for electric circuits, the objects being to open the circuit by means of a fuse without scattering the fuse metal outside the box, to effect a safe blowing of the fuse without damage to the walls of the fuse-box, to prevent the discharge of flame, and to cause a quiet operation of the fuse.

The distinctive feature of novelty of the invention involves the delivery of hot gases and pressure established by the blowing of the fuse itself to cut out a section of the fuse at an unfused portion of the same, thereby effectively opening the circuit before any considerable part of the fusible strip has been vaporized. To this end I inclose the fuse in a chamber the walls of which come in contact with parts of the fuse to keep them cool, other less protected parts being out of contact with the walls to insure more rapid heating of the fuse at those points. An open channel connects the parts least protected with a section of the fuse lying across a discharge-opening, in the path of which is a body of granular material, such as gravel, which chills the heated gases and prevents the discharge of flame from the fuse-box. Over the discharge opening or openings I mount a lid or valve which serves as an indicator to show when the fuse has been blown.

The novel features of the invention will be more specifically pointed out hereinafter and will be definitely indicated in the claims appended to this specification.

In the accompanying drawings, which illustrate several forms of the invention, Figure 1 is a sectional view of one form on a plane indicated by the line X Y of Fig. 2. Fig. 2 is a bottom plan view of the top section of this form. Fig. 3 is a bottom plan view of the middle section. Fig. 4 is a perspective view of a fuse-card comprising a strip of fuse metal mounted in an asbestos sheet. Fig. 5 is a top plan view of a complete fuse-box. Fig. 6 is a sectional view of a second form, and Fig. 7 is a plan view of the lower section of the same.

I will first describe the type shown in Figs. 1, 2, 3, 4, and 5 of the drawings. In this type the fuse-box is composed of three sections 1 2 3, having intervening packing-strips composed of sheets of asbestos 4 5. The walls of the box are formed of some comparatively infusible material, for which I have found soapstone effective. The three sections of the box are firmly clamped together, so as to make gas-tight joints, by means of a bolt 6, to which a handle 7 is connected, by means of which a tight joint may be effected. The upper member of the box which contains the fuse is recessed at 8 9 to form a receptacle for two fuse-clips 10 10^a, which may be fastened into the walls of the soapstone by screws 11 11^a, &c., as indicated in Figs. 1 and 5. A curved groove 12 is formed in the under side of the top chamber, the long side of which incloses a portion of the fuse and the ends of which form chambers 12^a 12^b over discharge-openings 13^a 13^b for the gases developed by the blowing of the fuse. The shape of the fuse is indicated in Fig. 4, where 13 indicates the section of the fuse which lies in the groove 12. The fuse itself is supported in a sheet 14, of asbestos, which forms the separating means of the two members 1 2 of the fuse-box. The asbestos being of a yielding nature not only prevents leakage of gas from the walls of the box, but prevents leakage between the melted parts of the fuse and the terminals. The portion 13 of the fuse is supported out of contact with the asbestos or with the walls of the box, as may be seen from Figs. 1 and 4. This may be effected, as indicated, by forming the fuse from a flat strip of fuse metal, the two legs of which lie in contact with the asbestos, as indicated in Fig. 4. Short sections 15 15^a of the fuse pass through holes in the asbestos, so as to be exposed to the discharge-openings 13^a 13^b when the parts are assembled. The middle section of the fuse-box is provided with openings to accommodate the clips 10 10^a and the circuit-terminals 16 16^a and the discharge-openings passing entirely through its walls.

On the under side are two recesses of considerable capacity, as indicated at 17 17ª, communicating with the bottom of the discharge-openings 13ª 13ᵇ by a narrow channel, as indicated in Fig. 1 at 18. The rear of these recesses communicates with vertical openings 19 19ª, which communicate with the atmosphere and the outer end of which is covered by a pivoted aluminium cover 20. The spaces 17 17ª communicate with the discharge-openings 19 19ª by extensions 21 21ª of the recesses 17 17ª The recesses 17 17ª are filled with a broken or granular material—such, for example, as gravel—and the bottom section of the box is clamped on by means of set-screws 22 22ª. The bottom plate carries also the terminals 16 16ª, on which binding-posts of any desired character may be mounted. The terminals are provided with elastic clips 23 23ª to receive the knife-contacts forming an extension of the fuse-clips, all of which will be evident from Figs. 1 and 3. The members of the fuse are clamped between metal washers 24 24ª to prevent fracture from the strain.

With a device organized substantially as described the operation is as follows: In case of an overload on the circuit in which the fuse-box is located the parts of the fuse in contact with the walls of the fuse-box or the asbestos packing heat less rapidly than the other parts, and the fuse first gives way at the long unprotected section 13, which is surrounded by air. The pressure developed creates a flow of hot gases around the channel 12 and delivers a hot stream on the sections 15 15ª of the fuse, thereby quickly melting and forcibly driving them out into the channels 13ª 13ᵇ. These sections are later to give way by reason of the fact that they are short in length and are in contact with the box-walls, as they are held firmly in grooves 25 25ª of the upper section of the box. Thus the fuse is cut at two independent points, and the arc formed at the severed edges is rapidly stretched and quickly extinguished, the volatilized material being driven through the gravel and out of the eduction-ports 19 19ª. The gravel being cold relatively to the gases and exposing a great area of surface chills them, condensing the volatile fuse metal and absorbing heat, so as to prevent any discharge of flame from the fuse-box. The pressure delivered by the outgoing gases throws up the indicator 20, and thereby gives visible evidence of the integrity or rupture of the fuse.

A fuse constructed as herein described safely and quietly extinguishes the arc without noise and without the display of fire in case of moderate overloads or heavy short circuits. The fuse-wire being mounted on a flexible insulating-card of some fireproof material—such, for example, as asbestos—is readily stored for the market and is self-packing at the joints of the box when put in place.

In the type illustrated in Figs. 6 and 7 the fuse-box is formed of two sections and embodies the same general principles of operation as outlined in connection with the first form described. The lower section of the fuse-box 26 is provided with two conical recesses 27 27ª, in the bottom of which are clamps for a fuse 28. These clamps may be ordinary set-screws taking into metal terminals 29 29ª, extending outside of the fuse-box. The fuse is led across a diaphragm 30 30ª, lying snugly in a groove formed in the same, and its middle part traverses an air-chamber 31, which communicates by tortuous passages with discharge-openings 32 32ª from the box, these tortuous passages intersecting the fuse at several distinct points, as at 33 33ª. Sloping walls at the point where the passages cross the fuse rise to a point comparatively close to the sections 33 33ª of the fuse, as indicated in Fig. 7. From this construction it results that when the fuse blows the parts in contact with the walls of the box heat less rapidly than the central part, which is surrounded by air, and when it gives way at the latter point pressure is developed, driving the hot volatilized products through the tortuous channel across the relatively cool parts 33 33ª, cutting them from the fuse, and thus interrupting the circuit at two distinct points and quickly extinguishing the arc. The products of volatilization pass out through the tortuous channel and are discharged at the openings 32 32ª. Between the two sections of the fuse-box is a layer of asbestos cloth 34, and the parts may be tightly squeezed together by clamp-screws, as indicated in Fig. 6.

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

1. A fuse-box containing a fuse having a part of its length of relatively small heat-dissipating capacity, and a chamber around this part in communication with a part extending over a discharge-vent the latter being slower to heat whereby pressure is delivered to cut the fuse at the discharge-opening.

2. A fuse-box containing a fuse having a part of its length inclosed in a chamber communicating by a closed channel with another part extending over a discharge-vent, and means for giving the latter part greater heat-dissipating capacity.

3. A fuse-box containing a fuse-strip, and means for developing pressure to cut the fuse at a relatively cool point or overload in the circuit in which it is connected.

4. A fuse-box having a fuse adapted to give way at a determinate part, and means for delivering the heated products across a relatively cool part of the fuse, whereby the same is cut, and the arc extinguished.

5. A fuse-box having an inclosed fuse, means for maintaining parts thereof at a relatively cool temperature to other parts, and communicating passages for discharging the heated products across the cooler parts, said passages where they cross said cooler parts, having a small cross-section.

6. A fuse-box having a fuse-strip wholly

within the same, means for cutting a section from the fuse on overload, and walls closely embracing by an interposed packing the section to be cut, thereby protecting the terminals.

7. A fuse-box having an inclosed arch-shaped fuse, an air-chamber around the bent portion, and channels connecting said chamber with a discharge-vent, the two legs of the arch crossing said channels.

8. A fuse-box comprising a plurality of sections having gas-tight joints, means for causing the fuse to heat quicker at some points than others, means for developing pressure on overload, a vent in the line of pressure intersecting a relatively cool part of the fuse and means for causing a delivery of hot gases from the arc formed at the most easily heated spot across the vent.

9. A fuse-box comprising a plurality of sections having gas-tight joints, means for developing pressure on overload, a vent to the outside of the box in the line of pressure intersecting a part of the fuse, and a body of granular material in the vent.

10. A fuse-box comprising a plurality of sections separated by asbestos packing, means for clamping the parts to make the joints gas-tight, means for cutting the fuse at a plurality of points on overload, a discharge-path to the atmosphere for the arc-gases and a heat-absorbing material in said path.

11. A fuse mounted in a fireproof insulating-sheet and held between insulating-walls clamping the insulating-sheet.

12. A fuse mounted in a sheet of asbestos and held between insulating-walls clamping the insulating-sheet.

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

TYCHO VAN ALLER.

Witnesses:
BENJAMIN B. HULL,
FRED RUSS.

Correction in Letters Patent No. 720,087.

It is hereby certified that in Letters Patent No. 720,087, granted February 10, 1903, upon the application of Tycho Van Aller, of Schenectady, New York, for an improvement in "Electric Fuse-Boxes," an error appears in the printed specification requiring correction, as follows: In line 120, page 2, the word "or" should read *on;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of March, A. D., 1903.

[SEAL.]

F. I. ALLEN,
Commissioner of Patents.