

A. F. DAUM.
SAFETY FUSE.

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1,061,226.

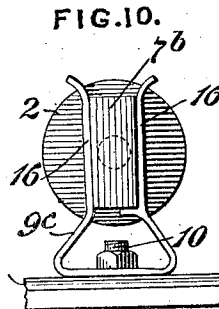
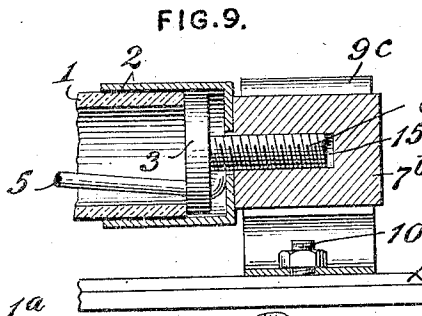
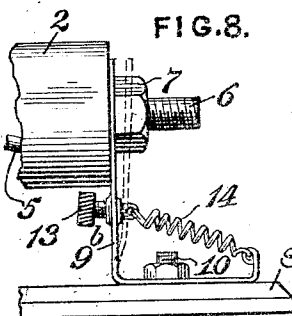
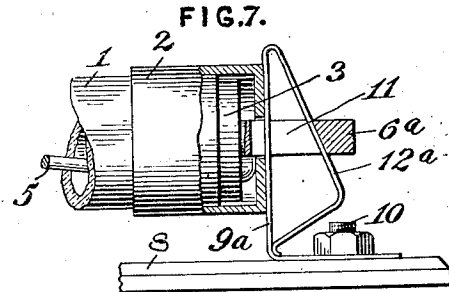
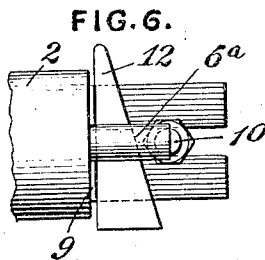
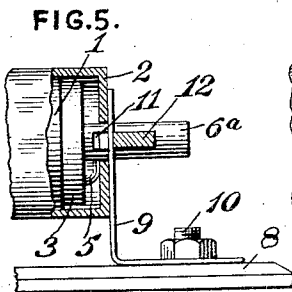
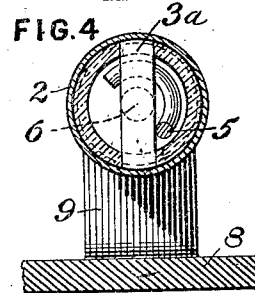
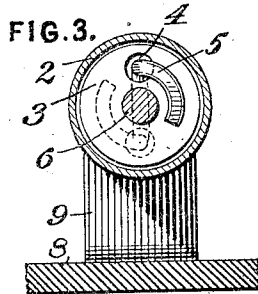
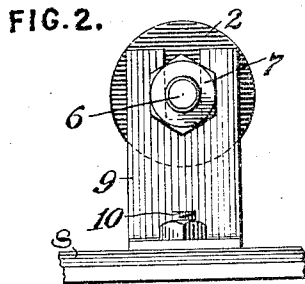
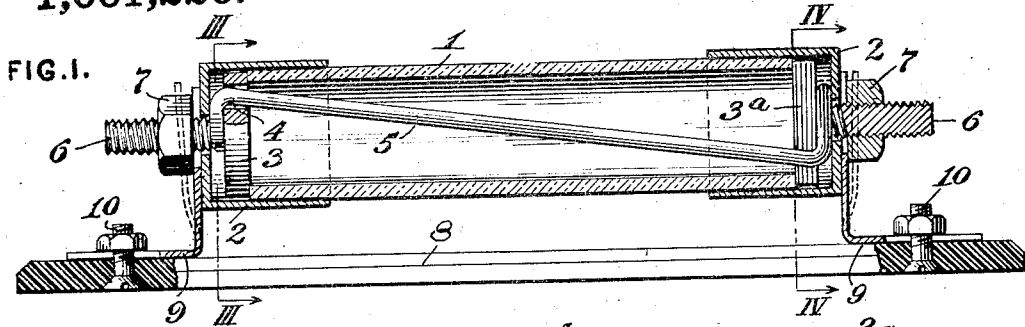
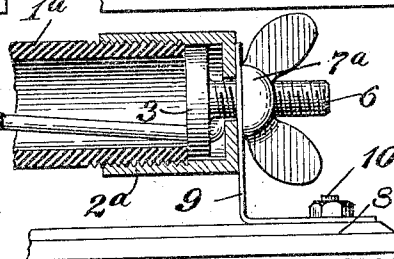


FIG. II.
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SAFETY-FUSE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALBERT F. DAUM, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Safety-Fuses, of which the following is a specification.

My invention relates to safety fuses, and has particular reference to that type of fuses called cartridge-fuses, or fuse-shells; but I do not limit my invention to this type of fuses except so far as the claims admit of no other reasonable construction.

The more important objects of my invention are to construct a cartridge-fuse or fuse-shell so that it will indicate whether or not it has blown; to do away with the threading of at least one end of the body and of at least one of the caps; to increase the area of contact of the fuse-shells with the conductor terminals which the fuse-shells connect in circuit; to provide molding or elastic supports for one or both ends of the fuse-shells so that supports for the ends of the fuse-wires may, on the blowing of the fuse-wires, become more widely separated; thereby preventing the reestablishment of the circuit through the fuse-wires; to clamp the ends of the fuse-shells tightly to the terminals and at the same time increase the contacting surface of the fuse-wires with the terminals of the fuse-shells and to bind the ends of the fuse-wires tightly to the fuse-shell terminals; and to cheapen and simplify the class of articles to which my invention belongs.

Referring to the accompanying drawing, Figure 1 is a central longitudinal section through a safety-fuse and its connections constructed in accordance with one form of my invention; Fig. 2, an end view thereof; Fig. 3, a cross-section on the line III—III, Fig. 1; Fig. 4, a cross-section on the line IV—IV, Fig. 1; Fig. 5, a portion of one end of a second form of my invention, together with the support therefor, parts being in section; Fig. 6, a plan of Fig. 5, the broken-away part being restored; Fig. 7, a view similar in character to Fig. 5, but showing a third form of my invention; Fig. 8, a side view of one end of a safety-fuse and its support, showing a fourth form of my invention; Fig. 9, a longitudinal section of one

end of a safety-fuse and its support showing a fifth form of my invention; Fig. 10, an end view of Fig. 9; and Fig. 11, a section of one end of a safety-fuse, partly in elevation, showing a sixth form of my invention.

Referring first to Figs. 1 to 4, 1 represents the preferably cylindrical casing of insulating material, such, for example, as glass, porcelain, fiber, or vulcanite. The ends of the casing 1 are provided with preferably copper caps 2, one or both of which may have a loosely fitting sliding or telescopic relation to the casing 1 as shown on Fig. 1 or threaded relation therewith, as shown on Fig. 11, where the cap is marked 2^a and the casing 1^a.

Referring now to the left-hand end of Fig. 1 and to Fig. 3, 3 designates a head between the end of the casing 1 and the end of the cap 2. The head 3 has at least one transverse opening, as 4, to receive one end of at least one fuse-wire, as 5, which has the end beyond the head 3 bent so as to lie against the outer face of the head. The head 3 has the stem 6 which is threaded and extends preferably loosely through a hole in the end of the cap, the hole opening into the interior of the casing. The nut 7 works on the stem 6. 8 represents an insulating base, on which any number of pairs of terminals 9 may be secured, as by the bolts 10. The terminals have the ends extending at a right angle to each other and slotted to receive the stems 6 and the bolts 10. The members of each pair of terminals 9 are spaced apart so that their inner or opposing faces can rest against the ends of the caps when the nuts 7 are screwed up tightly against the outer faces of the terminals. By turning up the nuts tightly, the ends of the fuse wire 5 are tightly clamped between the caps and the adjacent heads so as to make broad and close electric connections. The head 3, the stem 6 and the nut 7 are all preferably good conductors of electricity but they or any of them might in some instances be made of poor or non-conducting material. I have shown the nuts in Figs. 1, 2, and 8 designed for operation by a wrench, while in Fig. 11, I have shown the winged nut 7^a designed for hand operation.

Referring now to the right-hand end of Fig. 1 and to Fig. 4, the parts are the same

as at the left hand of Fig. 1, except that the head 3^a is made oblong with its extremities seated in recesses in the end of the casing to prevent any liability of the stem 6 turning when the nut 7 is actuated. The end of the fuse-wire 5 passes between the side of the head 3^a and the wall of the casing.

When an excessive current passes through the fuse-wire 5, more or less of it is melted and converted into metallic vapor with explosive violence causing one or both of the end caps (depending on presence or absence of one threaded cap, as shown in Fig. 11) to be driven a short distance outwardly as indicated by the dotted position of the terminals 9 in Fig. 1, whereby the fuse-wire is with certainty disconnected and prevented from re-connecting. It is with many cartridge fuses impossible to tell which of a number of them has been blown; but with my loosely fitting caps, the fact that a fuse has been blown can at once be told by the position of the cap or caps, which will be somewhat displaced from their normal position. When the casing is made of transparent glass, the blown fuse-wire can be at once directly detected also.

In Figs. 5 and 6, I have shown the stem 6^a unthreaded but with a longitudinal slot 11 to receive the wedge 12, which takes the place of the nut 7 (Fig. 1) and tightly clamps the terminal 9 between itself and the end of the cap 2.

In Fig. 7, the upstanding member of the terminal 9^a is made wedge-shaped as shown at 12^a and is resiliently or flexibly connected to the member in contact with the base 8. While the upstanding member may be variously made, I have shown it, not of a wedge-shaped piece of sheet-metal, but of a strip of metal bent to the shape of a wedge or triangle with the apex at its outer end. The end of the cartridge-fuse, which is like that of Figs. 5 and 6, is forced down on the wedge 12^a, the slot 11 receiving the wedge and clamping the end of the fuse-wire in an obvious manner.

Referring now to Fig. 8, the outwardly extending member of the terminal 9^b, which may be held against the cap 2 by various means, as by the nut 7 and the threaded stem 6, contains the screw 13 having its outer end connected to the contraction spring 14. When the fuse-wire 5 which is placed under tension by the spring 14, is blown, the spring pulls the terminal to the position shown in dotted lines and holds it there, so that it can be known from its displacement and that of the cap 2, that its fuse-wire has been disconnected. The screw 13 serves as a means for adjusting the tension of the spring 14. It is readily understood that the terminal might itself be made of resilient material so put under strain that, when connected to the fuse-

shells and released by the separation of the fuse-wire, it will assume the dotted position shown in Figs. 1 and 8.

In Figs. 9 and 10, I have shown my invention adapted for use as a knife switch, or a cartridge-fuse with knife terminals. Instead of using the nut 7, I make the nut, marked 7^b, of oblong rectangular shape, like the ends of the well-known cartridge-fuses with knife terminals integral with the end-caps. I provide one end of the nut or knife-terminal 7^b with the threaded hole 15 to fit the stem 6. The terminal or nut 7^b is turned up tight against the end of the cap so as to clamp the end of the fuse-wire 5 between the cap 2 and the head 3. The terminal 7^b slides between the blades 16 of the base terminal 9^b of usual construction, the blades acting as yielding or resilient holding means for the cap 2. When the fuse-wire 5 blows, the cap 2 will slide into engagement with the terminal 9^b, thus indicating that the cartridge needs a new fuse-wire.

While I have shown only one end of several forms or designs of my invention, and in Fig. 1 I have shown two forms thereof, it is to be understood that the opposite ends of the cartridge fuses may be alike or different, or one end only may contain my present invention. I have not shown the casing provided with a non-conducting filler as I have found it to be unnecessary in most cases.

The cartridge-fuses alone do not comprise the line terminals 9, 9^a, or 9^b, and where these terminals are not desired, the fuses are shipped with the nuts 7 or 7^a or the wedges 12 in engagement with the ends of the caps. The fuses may be used as shown in the drawings or they may be left with the nuts or wedges in contact with the caps, each of which may be inserted between spring terminals of the usual type. In some instances the nuts 7 or 7^a or the wedges may be omitted, when the said usual spring terminals for gripping the sides of the caps are used.

As will be seen, the member 3 or 3^a is free from peripheral engagement with the end cap, and is also free from any engagement with the shell 1 so far as endwise movement of the shell is concerned, the position of the member 3^a within the slots of the shell simply acting to prevent the member from rotating relative to the shell, but permitting the member to be drawn toward the end cap so as to partially lift the member from the bottom of the recesses. It will therefore be understood that I have provided a construction by means of which the clamping action on the fuse element is provided solely by the end cap and member, and that when this clamping action is completed, the relative positions of the

member and end cap are fixed, thereby eliminating any liability of the fuse element changing its contact relationship with either part while the fuse is in service, a positive advantage where there is shrinkage of the shell, or where there is an arrangement of parts such, for instance as shown in Fig. 1 in which the end cap is free from positive connection with the shell. In the form shown in Fig. 11, the shrinkage of the fiber when it becomes dry tends to loosen the threaded connection so as to permit a slight play between the opposing threads, and where, as in the construction shown in my Reissue Patent #13,312, the end of the shell forms an abutment against which the member is held to provide the clamping action on the fuse element, this play may become serious in that it tends to destroy the contact between the fuse element and the member or cap. This objection is eliminated in the present invention by reason of the fact that the end cap and member are held in fixed relationship so that relative movement of the shell and end cap has no effect upon the clamping action or the contact.

I claim—

1. In an electric safety apparatus, a casing of non-conducting material, an end cap therefor provided with a hole opening into the interior of the casing, a clamping-head, a stem therefor extending through the hole in the cap, a fuse-wire having one end lying between the head and the cap, a terminal external to the cap, and means for causing the head to clamp the end of the fuse-wire between the head and cap and to clamp the terminal to the cap.

2. In an electric safety apparatus, a casing of non-conducting material, an end cap therefor provided with a hole opening into the interior of the casing, a clamping-head, a stem therefor extending through the hole in the cap, a fuse-wire having one end lying between the head and the cap, an electric terminal, and means cooperating with the stem and acting on the terminal for simul-

taneously clamping the terminal to the cartridge-fuse, and the fuse-wire between the head and the cap.

3. In an electrical apparatus, a casing, an end cap thereon, a bolt having its head within the casing and its stem extending through the end of the cap, a fuse within the casing and with one end between the bolt head and the cap, and a device movable with respect to the stem and cooperating with the stem and the outer face of the cap to clamp the fuse between the bolt head and the cap.

4. In a refillable fuse, an end cap, a shell adapted to extend into said cap, a metallic member within the end cap and free from peripheral engagement with the skirt of the cap and cooperating with the cap to secure a fuse element therebetween, said member being also free from holding engagement with the shell, and means for positioning said member within said cap to provide a normally fixed relation between said cap and member independently of the shell.

5. In a refillable fuse, an end cap, a shell adapted to extend into said cap, a metallic member within the end cap and free from peripheral engagement with the skirt of the cap and cooperating with the cap to secure a fuse element therebetween, and means for positioning said member within the cap to provide a normally fixed relation between said cap and member independently of the shell, a spring contact, said means including a stem carried by said member and extending through said cap, and external means for clamping said spring contact to the face of said cap, said latter contact acting to exert an outward pull on the connecting members when the fuse blows.

Signed at Pittsburgh, Pa., this 6th day of July, A. D. 1911.

ALBERT F. DAUM.

Witnesses:

F. N. BARBER,
ALICE E. DUFF.