

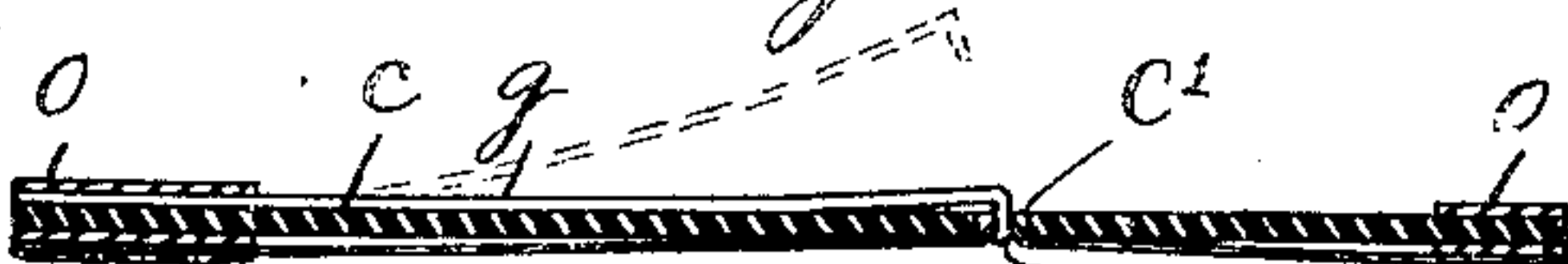
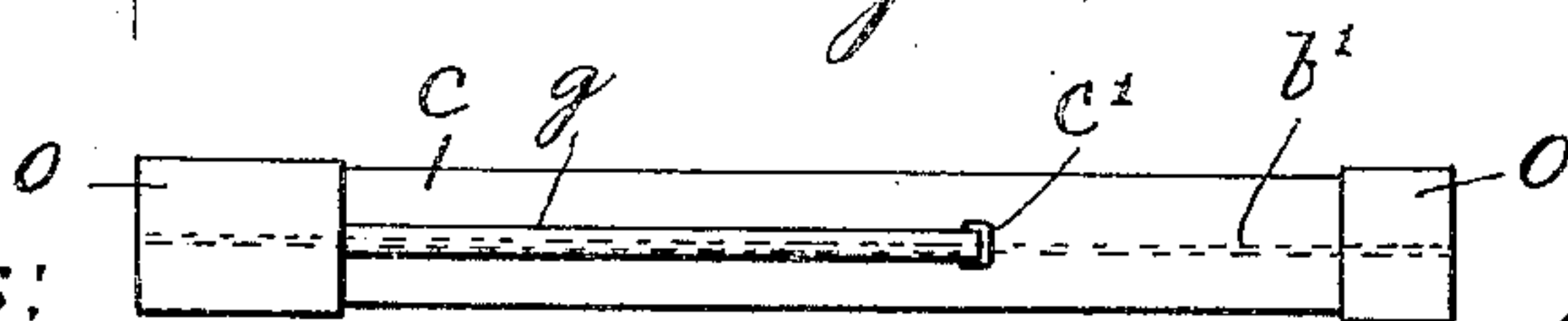
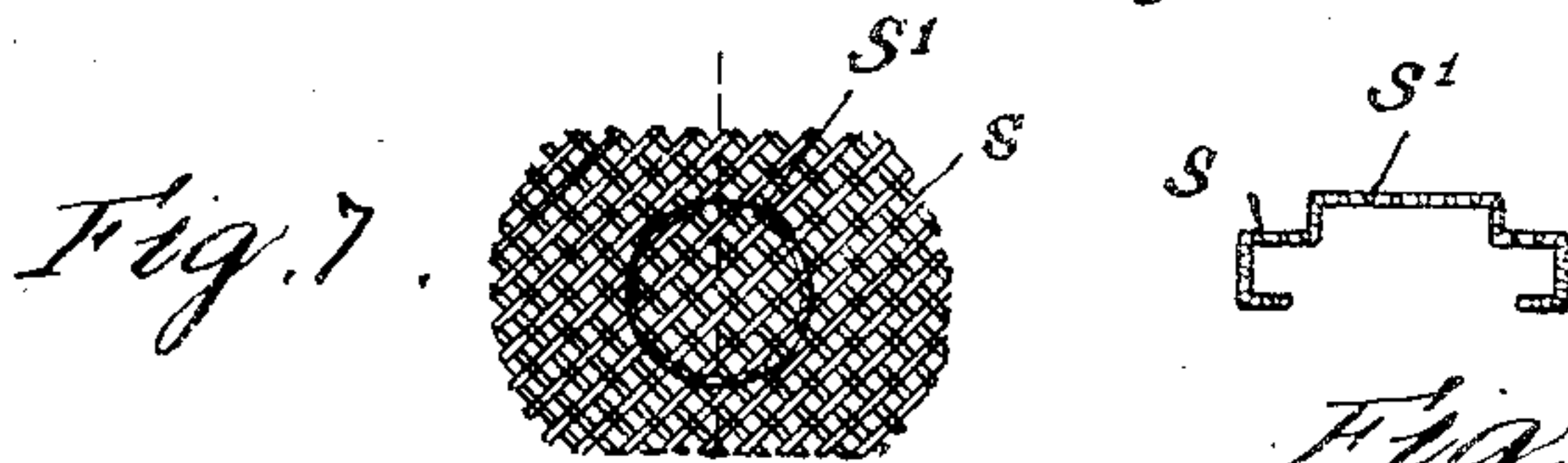
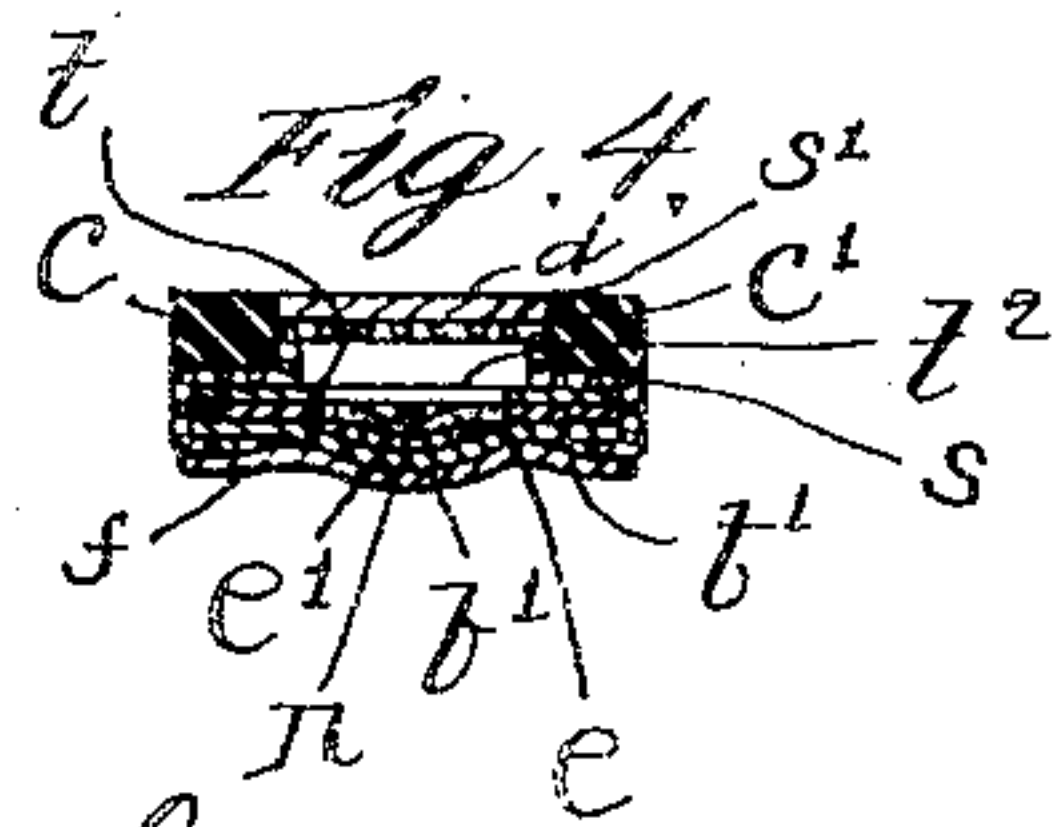
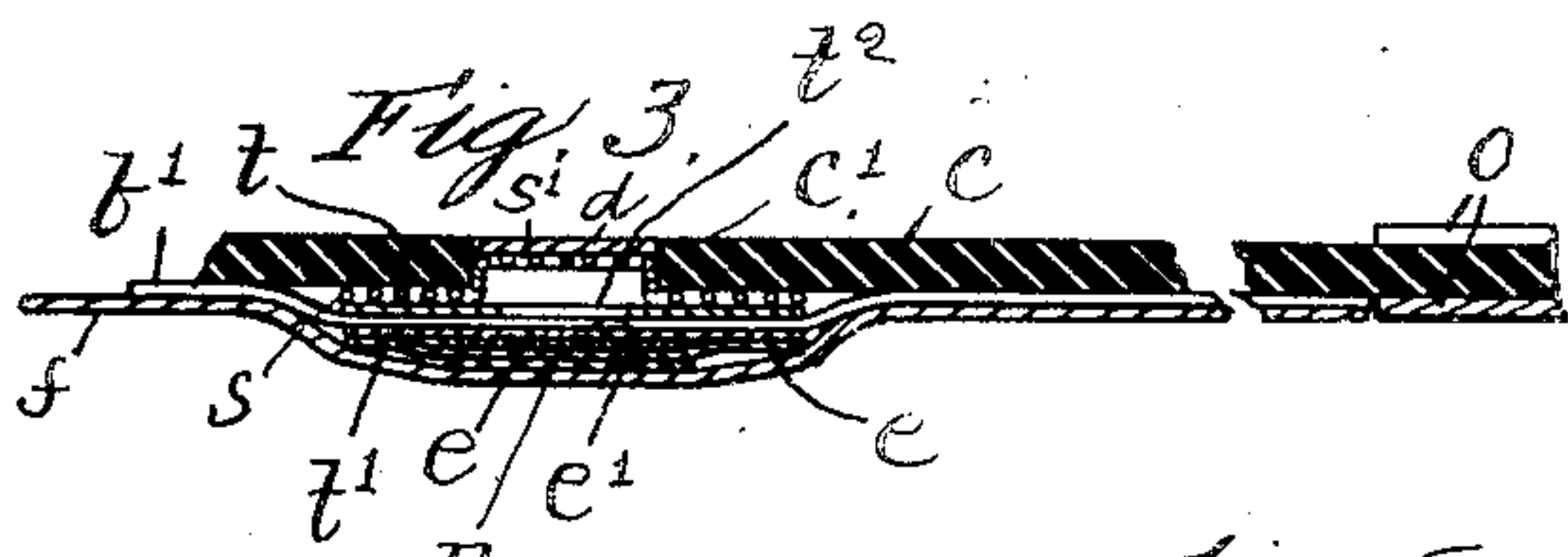
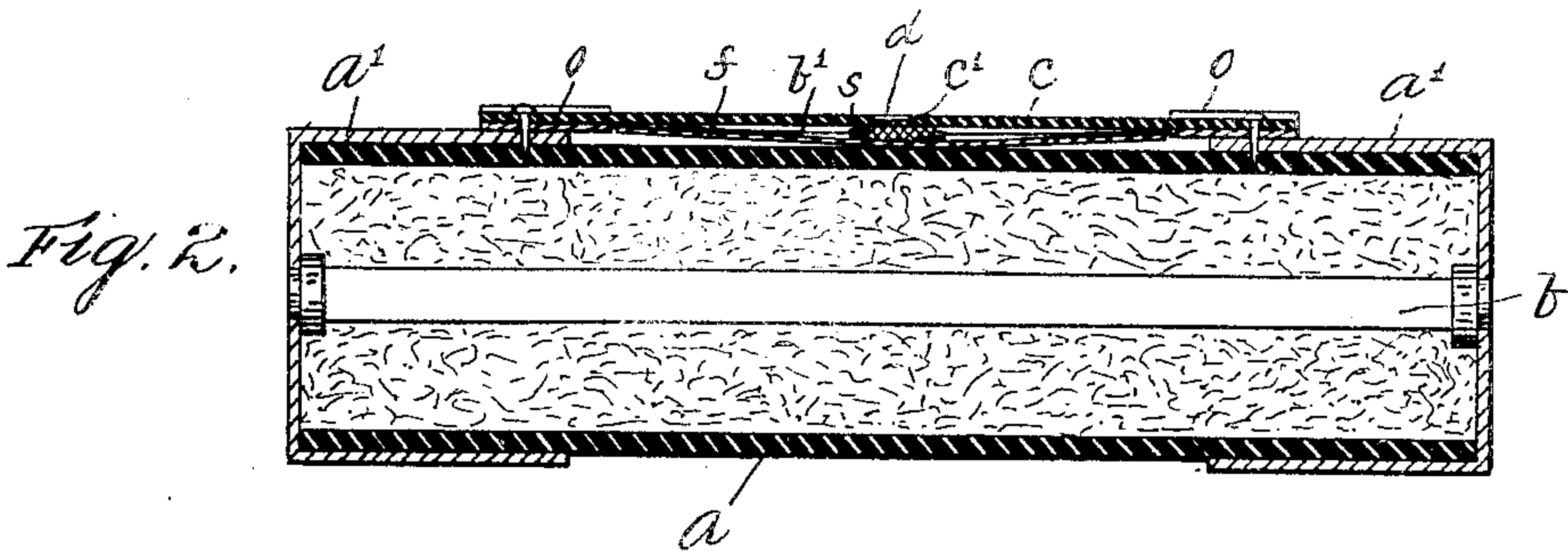
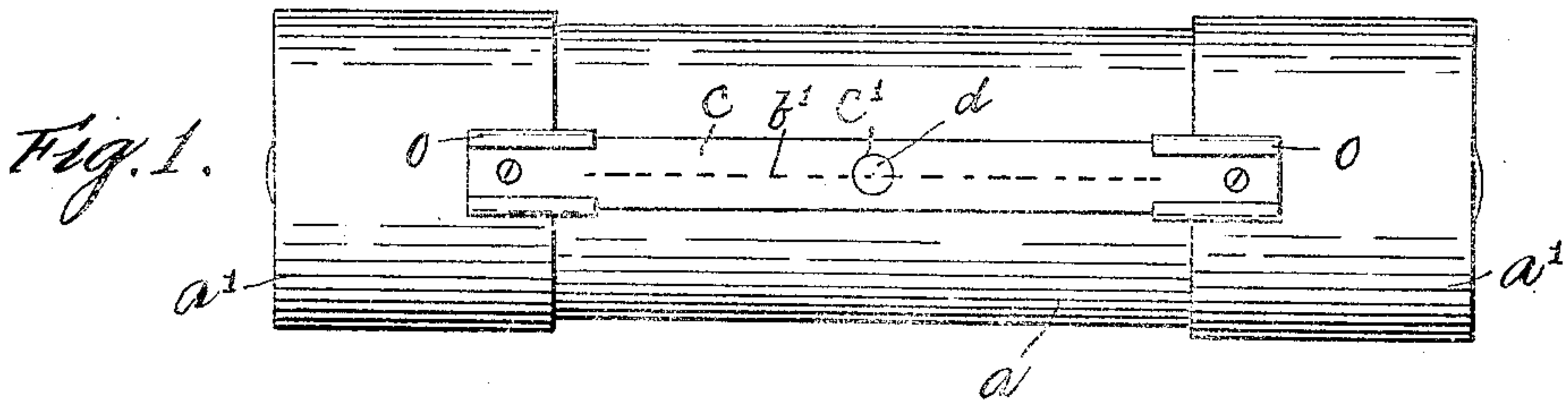
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PATENTED MAY 21, 1907.

L. B. BUCHANAN.

INDICATING MECHANISM FOR ELECTRIC FUSES OR CUT-OUTS.

APPLICATION FILED SEPT. 14, 1906.



Witnesses:

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LEONARD B. BUCHANAN, OF WOBURN, MASSACHUSETTS.

INDICATING MECHANISM FOR ELECTRIC FUSES OR CUT-OUTS.

No. 854,327.

Specification of Letters Patent.

Patented May 21, 1907.

Application filed September 14, 1906. Serial No. 334,585.

To all whom it may concern:

Be it known that I, LEONARD B. BUCHANAN, of Woburn, county of Middlesex, State of Massachusetts, have invented an Improvement in Indicating Mechanism for Electric Fuses or Cut-Outs, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to an indicating-mechanism for an inclosed electric fuse or cut-out; and its object is to construct an indicating-mechanism, which, by itself, represents a distinct article of manufacture that can be sold separate from the fuse; which is adapted to be applied to a fuse whenever desired; which is adapted to be disposed externally on the fuse and therefore may be readily applied thereto; which, when applied to the fuse conceals the fuse-wire which is provided for operating the indicating-device; which may be applied to an existing fuse not now provided with an indicating-mechanism, or may be used to replace the indicating-mechanism of a "blown" fuse, in case the fuse is of the renewable type or is capable of being renewed or has been renewed; and which may be readily removed from the fuse to which it is applied, to be replaced by another, as in the case of a "blown" fuse which is provided with my indicating-mechanism.

Figure 1 shows in plan view an inclosed electric fuse provided with an indicating-mechanism embodying this invention. Fig. 2 is a longitudinal section of the inclosed electric fuse and indicating-mechanism shown in Fig. 1. Fig. 3 is a longitudinal section of the indicating-mechanism, a portion of the support and fuse-wire being broken away. Fig. 4 is a transverse section of the indicating-mechanism shown in Fig. 3. Fig. 5 is a plan view of the indicating-mechanism. Fig. 6 is a side view of the indicating-mechanism. Figs. 7 and 8 are details to be referred to. Figs. 9 and 10, respectively, show a plan view and longitudinal section of a modified form of indicating-mechanism embodying my invention.

The electric fuse which is herein shown for the sake of illustrating my invention is a familiar form of inclosed fuse of the cartridge type, yet I desire it to be understood that the indicating-mechanism embodying my invention may be applied to other forms of inclosed electric fuse.

In the fuse shown, *a* represents the cylindrical tubular body of the shell or case and *a'*, *a'* the terminals thereon, which, are herein shown as metallic end pieces or caps.

b is the main fuse wire which is contained within the shell or case and which is herein shown as a strip of fusible metal, which is connected at its ends to the metallic terminals, thereby extending longitudinally through the shell or case. The shell or case is designed to be filled with anhydrous plaster of paris, or any other of the finely divided or porous nonconducting refractory materials commonly used in filling inclosed fuses.

The indicating-mechanism, two forms of which are herein shown for the sake of illustrating my invention, comprises an indicator, or indicating-device, actuating means therefor, a fuse strip or wire, hereinafter referred to as a fuse-wire and a covering or support. The covering may be made of any nonconducting material capable of enveloping the fuse-wire and withstanding ordinary wear and tear and the heat it is likely to meet, and as herein shown, it consists of two parts. The upper part is a strip or plate *c* of any suitable material, preferably a stiff fiber capable of acting as a support, having at a point intermediate its length a hold *c'* of circular or other form, for the indicating-device; and said strip or plate *c* is made long enough to extend along the outside of the shell or case and is adapted to be attached to the end caps *a'*, *a'* thereof by a screw or otherwise. The lower part of the covering is preferably a piece of cloth *f* attached to the upper part of the covering.

The indicating-device is located at the hole *c'* in the upper part of the covering, and, as herein shown, said indicating-device and the means for actuating it, are substantially the same as shown in Letters Patent No. 801,467, dated October 10, 1905, being herein shown merely for the sake of illustrating one form of indicating-device which may be employed.

The indicating-device consists of a circular piece *d* of leather or other suitable material adapted to be placed in the hole *c'*, so as not to project beyond the exterior line of the support, and to be retained therein by friction, yet, so far as my invention is concerned any other form of indicating-device may be employed. The indicating-piece *d* is designed to be ejected from the hole by pressure pro-

duced in the indicating-compartment, due to the operation of the actuating means, as will be explained.

The fuse-wire b' should be of small cross-sectional area and of suitable metal so as not to maintain an arc, as for instance, fine German silver wire or foil, preferably greatest in resistance under the hole c' so as to heat most at that point. This fuse-wire is extended along the under side of the support c , and is adapted to be connected with the terminals of the fuse, so as to shunt the main fuse wire b , and being of high resistance will carry only a trivial part of the current until the main fuse wire is melted. The shunt fuse-wire b' crosses the hole c' , and at said hole the indicating-compartment is formed, so that said fuse-wire extends through said compartment.

t, t' , represents two plates or pieces of material, such as cloth, placed one upon the other with the fuse-wire b' between them, said plates or pieces being attached together and made large enough to more than cover the hole c' in the support c . The plates or pieces t, t' are each formed with a circular hole t^2 through them, and the fuse-wire b' crosses this hole, and said plates or pieces are so located with respect to the hole c' in the support c that the hole t^2 therethrough lies opposite said hole c' . These plates or pieces hold the fuse-wire b' in the indicating-compartment.

The actuating means for the indicating-device consists essentially of a gas producing element, which, as herein shown, consists of a plate or disk e of any suitable material having upon one side of it a small quantity of gas producing material e' , as gun powder for instance, which is laid thereon and held in place by adhesive material. The gas producing element is placed against the under side of the plates or pieces t, t' , being preferably adhesively attached thereto, and so located with respect thereto that the gas producing material e' lies opposite or enters the holes in said plates or pieces t, t' . A piece of fiber n is disposed next the gas producing element, so as to inclose the actuating means for the indicating-device in a separate compartment. The lower part of the covering of the indicating-device serves to hold the parts assembled and to secure them to the upper part of the covering or support c and also to completely inclose them in connection with the upper part of the covering. It is here shown as a comparatively large piece of cloth f , which covers the piece or plate n and is adhesively or otherwise attached to the support c , and said piece f is made long enough to extend along and cover the portions of the fuse-wire which would otherwise be exposed, to thereby so confine said fuse-wire as to exclude the air from it, excepting

in the indicating-compartment, so that the tendency will be for it to heat and melt in the indicating-compartment, adjacent the actuating means for the indicating-device. To prevent the passage of any flame through the hole c' in the support c , when the fuse-wire b' melts, a flame-resisting screen s is employed, see Figs. 7 and 8, of fine mesh, which is made large enough to at least cover said hole. This screen is placed next to the support c , between it and the means for holding the fuse-wire, and the opposite edges of said screen are or may be turned over the edges of the plates t, t' . The screen s is formed with a central projection s' of a diameter approximately as large as the hole c' in the support, and said projection extends into said hole, as shown. The projection assists in holding the screen in place, and also serves as a stop for the indicator d , and also provides a cavity to insure the production of a small compartment back of the indicator. When the fuse-wire b' melts the gas producing element explodes and the indicator d is ejected. In lieu of this form of actuating means other forms of actuating means may be employed, to operate the indicating-device shown, or other forms of indicating-device. For instance, referring to Figs 9 and 10, a modification of the indicating-device is shown, which consists of a spring acting strip g applied to the outside of the supporting-plate c , which extends along on said plate in the direction of its length, and is attached at one end to one of the terminal plates o , while its other or free end is bent downward and extends through the hole c' in the supporting-plate, and its downwardly extended end g' is formed with an eye through which the fuse-wire b' passes. The action of the spring actuating strip is for its free end to move away from the supporting-plate, as represented by dotted lines and when in such a position to indicate that the fuse has blown, but said strip is normally held by the fuse-wire under tension and against the supporting plate, as represented by full lines. It will be seen that in this modification the spring action, inherent in the indicating-device, serves as the actuating means for it.

The ends of the fuse-wire b' are designed to be electrically connected with the terminals a', a' of the fuse, and to accomplish this result terminal plates o, o are provided on the support c , which are herein shown as pieces of sheet copper placed upon and bent around the ends of the support c , which are secured by solder or otherwise to the ends of the fuse-wire, and said terminal plates o, o are respectively secured to the terminal caps a', a' by screws or otherwise, it being understood that the support c is made long enough to provide for thus enabling the terminal plates o, o to overlie the terminal caps.

In lieu of electrically connecting the ends of the fuse-wire to the terminal caps a' , a' by means of terminal plates o , o , as herein shown, my invention includes electrically connecting them thereto in any other manner; and when terminal plates, such as o , o , are employed their shape or size may be varied.

The indicating-mechanism thus described is independent of the fuse and may be sold as a separate article of manufacture; it is adapted to be applied externally to the fuse; it is adapted to be so arranged on the fuse as to conceal the fuse-wire which is employed for operating the indicating-device; it is adapted to be applied to a fuse not now provided with an indicating-mechanism, or to be used to replace the indicating-mechanism of a "blown" fuse in case the fuse is of the renewable type, or is capable of being renewed or has been renewed; and furthermore, it may be readily removed from a fuse to which it is applied, so as to be replaced by another, as in the case of a "blown" fuse which is provided with my external indicating-mechanism.

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

1. An indicating-mechanism for an inclosed electric fuse consisting of an indicating-device, actuating means therefor, a fuse-wire, a support for said parts, and terminals thereon electrically connected with said fuse wire and means for attaching the support to the outside of the shell or case of a fuse, and for connecting the fuse-wire electrically with the terminals of said fuse, substantially as described.

2. An indicating-mechanism adapted to be supported upon the exterior of the shell or case of an inclosed electric fuse, comprising an indicating-device, actuating means therefor, a fuse-wire, and means for electrically connecting the opposite ends of said fuse-wire with the exterior of the terminals of said fuse, substantially as described.

3. An indicating-mechanism adapted to be supported upon the exterior of the shell or case of an inclosed electric fuse, comprising an indicating-device, actuating means therefor, a fuse-wire, and means for electrically connecting the opposite ends of said fuse-wire with the exterior of the terminals of said fuse, and a support of insulating material for said indicating-mechanism, substantially as described.

4. An indicating-mechanism adapted to be applied externally to an inclosed electric fuse, comprising an indicating-device, actuating means therefor, a fuse-wire having conducting terminals secured to its ends for electrically connecting it with the exterior of the terminals of the fuse, a support for said

parts, and means for attaching said support to the exterior of the fuse, substantially as described.

5. An indicating-mechanism adapted to be applied externally to an inclosed electric fuse, comprising an indicating-device, actuating means therefor, a fuse-wire having terminal plates at its opposite ends for electrically connecting it with the exterior of the terminals of the fuse, a support for said parts which is engaged by said terminal plates, and means for attaching said support to the exterior of the fuse, substantially as described.

6. An indicating-mechanism adapted to be applied externally to an inclosed electric fuse, comprising an indicating-device, actuating means therefor, a fuse-wire, means for holding said fuse-wire adjacent said actuating means, and a support for said parts, composed of insulating material and having conducting terminals which are adapted to be attached to the exterior of the terminals of the fuse, substantially as described.

7. A supporting-plate of insulating material having conducting terminals adapted to be attached to the exterior of the terminals of an inclosed electric fuse having a hole through it, an indicating-device at said hole, actuating means for said indicating-device located back of it, but supported by said plate, a fuse-wire also supported by said plate and located adjacent said actuating means, the opposite ends of which are connected with the terminals of the supporting-plate, substantially as described.

8. A supporting-plate of insulating material having conducting terminals adapted to be attached to the exterior of the terminals of an inclosed electric fuse, having a hole through it, an indicating-device at said hole, actuating means for said indicating-device contained in a compartment back of said indicating-device, a fuse-wire extended through said compartment and along the under side of said plate, the opposite ends of which are adapted to be connected with the terminals of the plate, substantially as described.

9. A supporting-plate of insulating material having conducting terminals adapted to be attached to the exterior of the terminals of an inclosed electric fuse, a fuse-wire extending along the under side of said plate, and connected at its ends to the terminals of said plate, and an indicating-device borne by said plate for indicating the condition of the fuse, substantially as described.

10. An inclosed electric fuse having an auxiliary fuse-wire external to the casing thereof and removably connected to the exterior of the fuse terminals and an indicating-device, for indicating the condition of the fuse-wire, substantially as described.

11. An inclosed electric fuse having an external shunt fuse-wire, removably connected

at its ends to the exterior of the fuse-terminals, means for covering said fuse-wire and an indicating-device, for indicating the condition of the fuse-wire, substantially as described.

12. An inclosed electric fuse having exteriorly attached to its terminals a shunt fuse-wire, a supporting-plate for said shunt fuse-wire, an indicating-device supported by said plate, and actuating means therefor, substantially as described.

13. An inclosed electric fuse having removably attached to the exterior thereof an indicating-mechanism consisting of a fuse-wire electrically connected to the terminals of the fuse and an indicating-device for indicating the condition thereof, substantially as described.

14. An inclosed electric fuse provided with an indicating-mechanism removably attached to the exterior thereof consisting of a

covered fuse-wire, and an indicating-device for indicating the condition thereof, substantially as described.

15. An inclosed electric fuse of the cartridge type having removably attached on the exterior thereof an indicating-mechanism consisting of a covered conductor of small cross sectional area, electrically attached to the terminals of said cartridge fuse and an indicating-device for indicating the condition thereof, and actuating means for causing said indicating-device to operate, substantially as described.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

LEONARD B. BUCHANAN.

Witnesses:

B. J. NOYES,
CYNTHIA DOYLE.