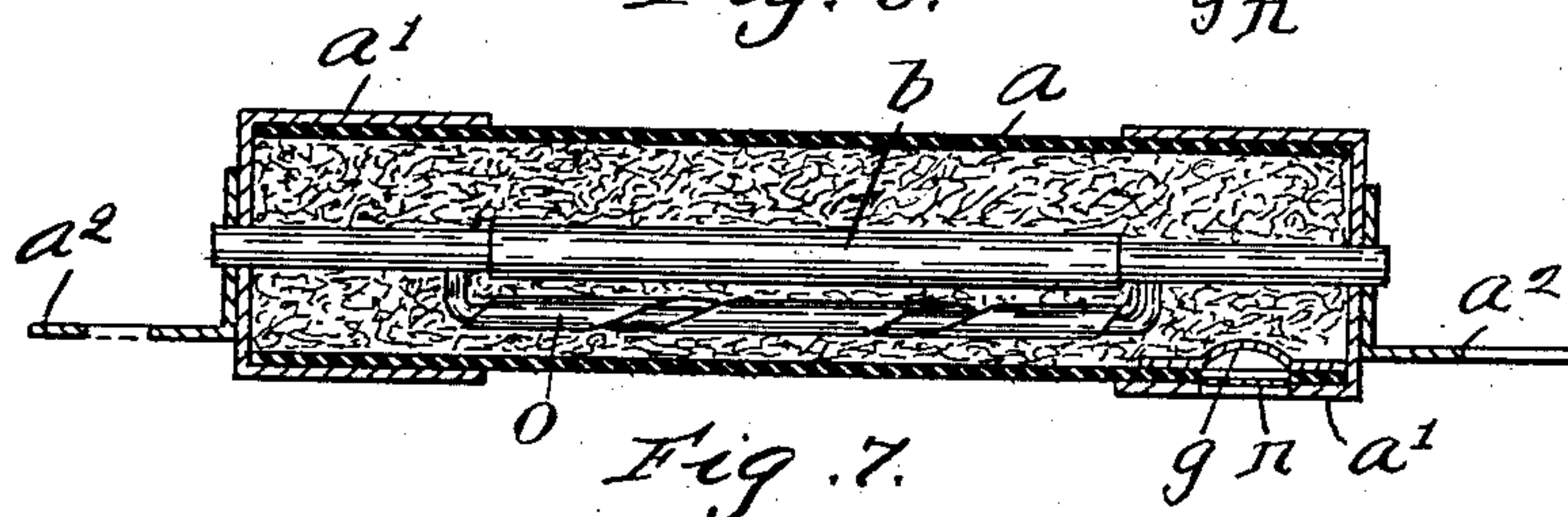
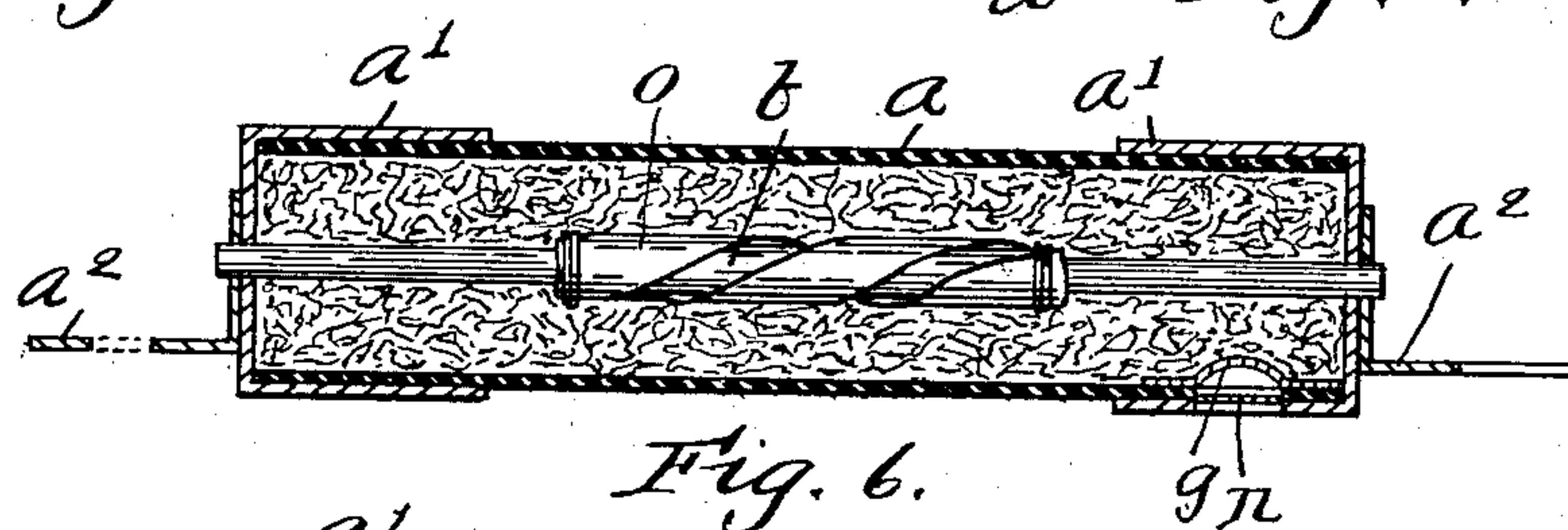
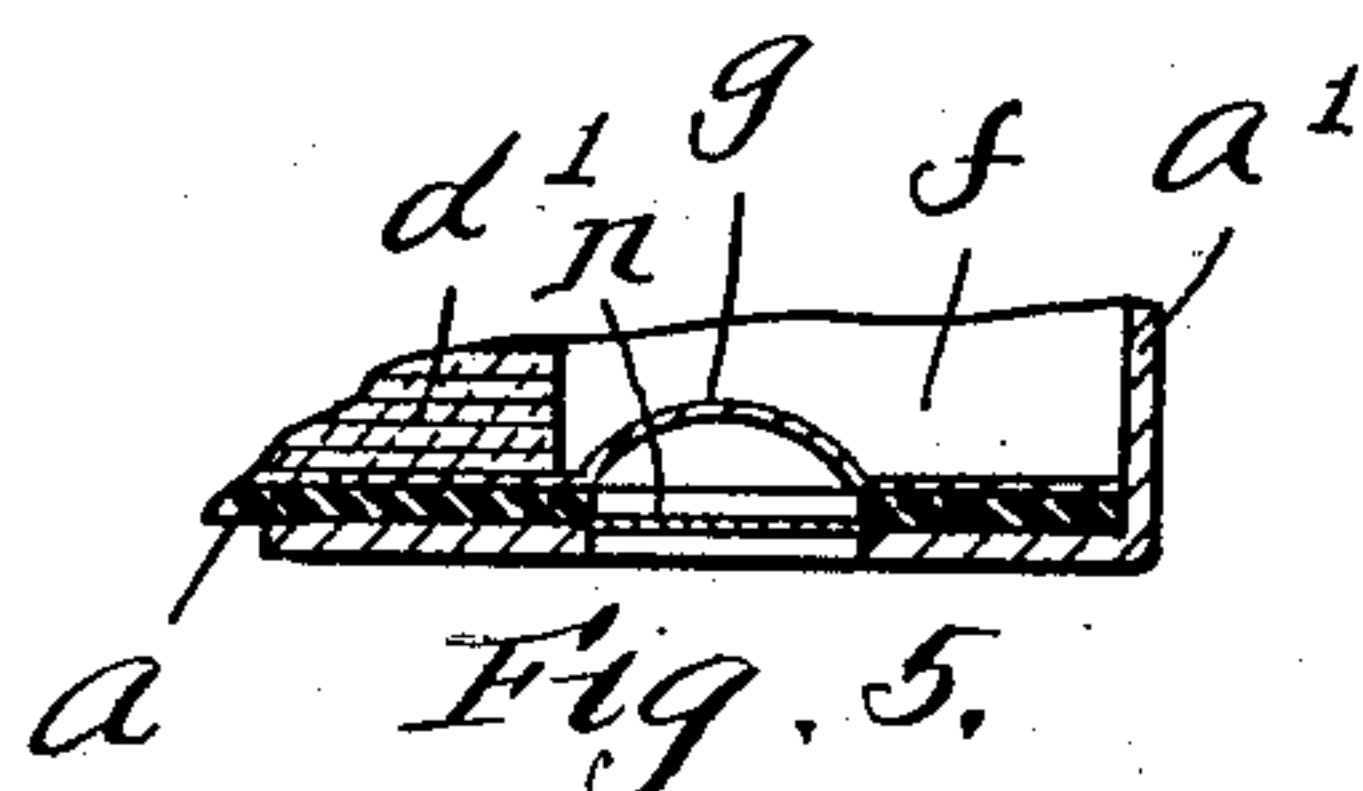
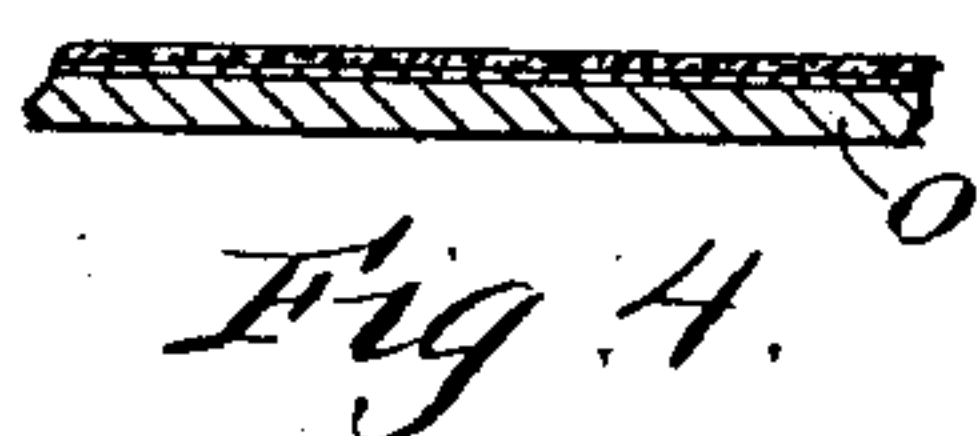
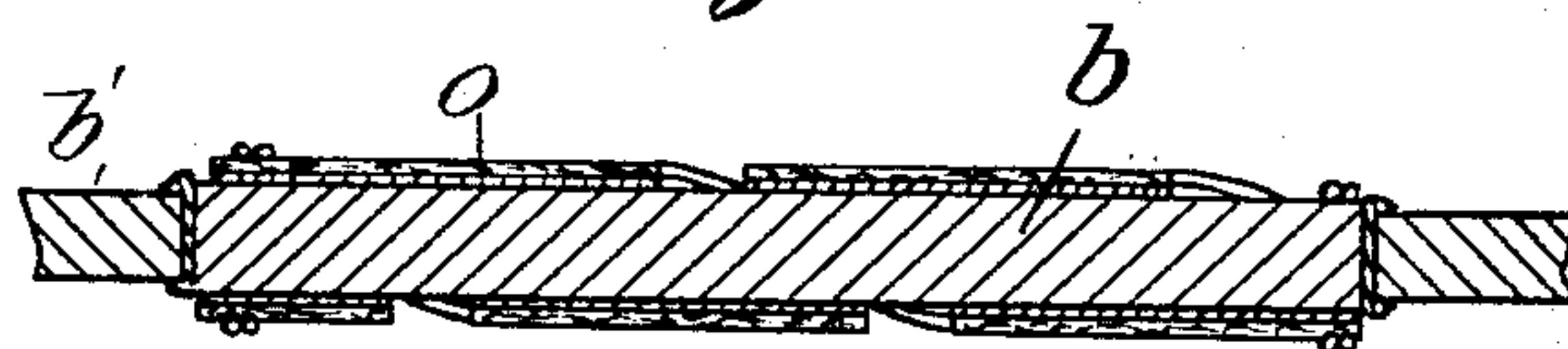
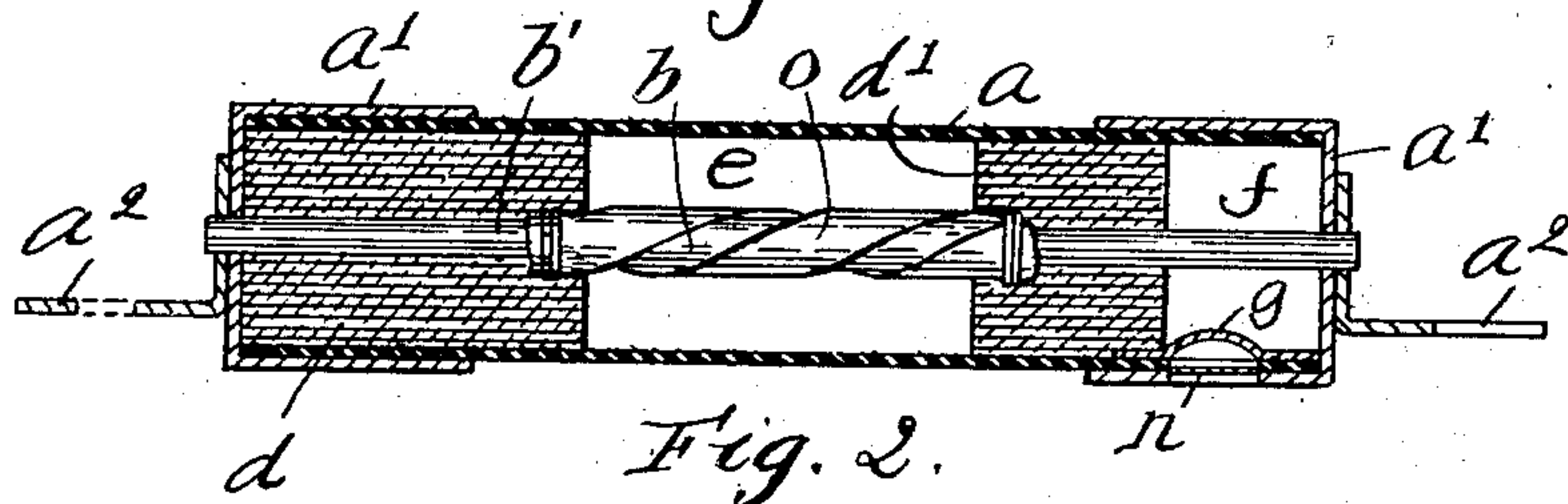
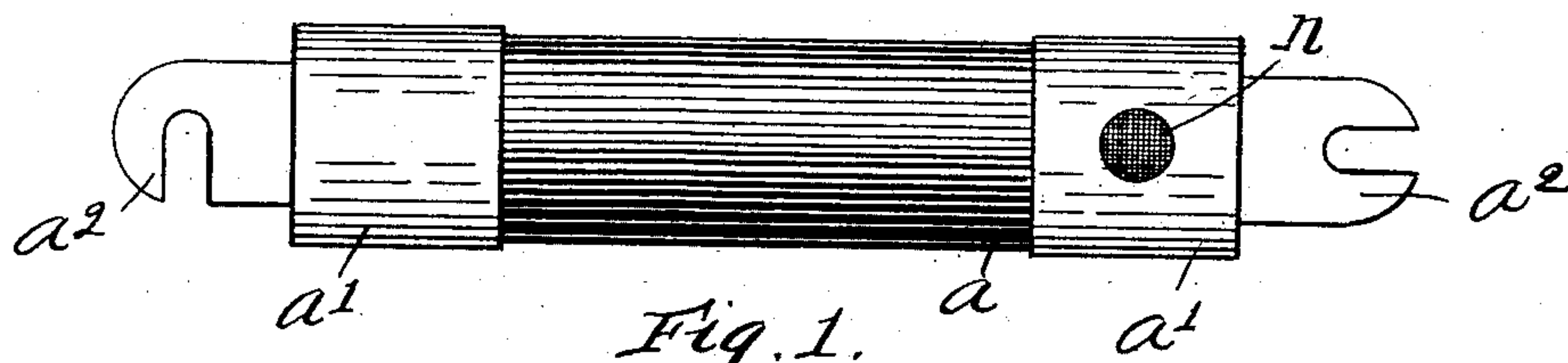


H. L. MORSE.
ELECTRIC FUSE OR CUT-OUT.

APPLICATION FILED FEB. 24, 1902.

NO MODEL.



Witnesses:

H. B. Davis.

M. C. Bill

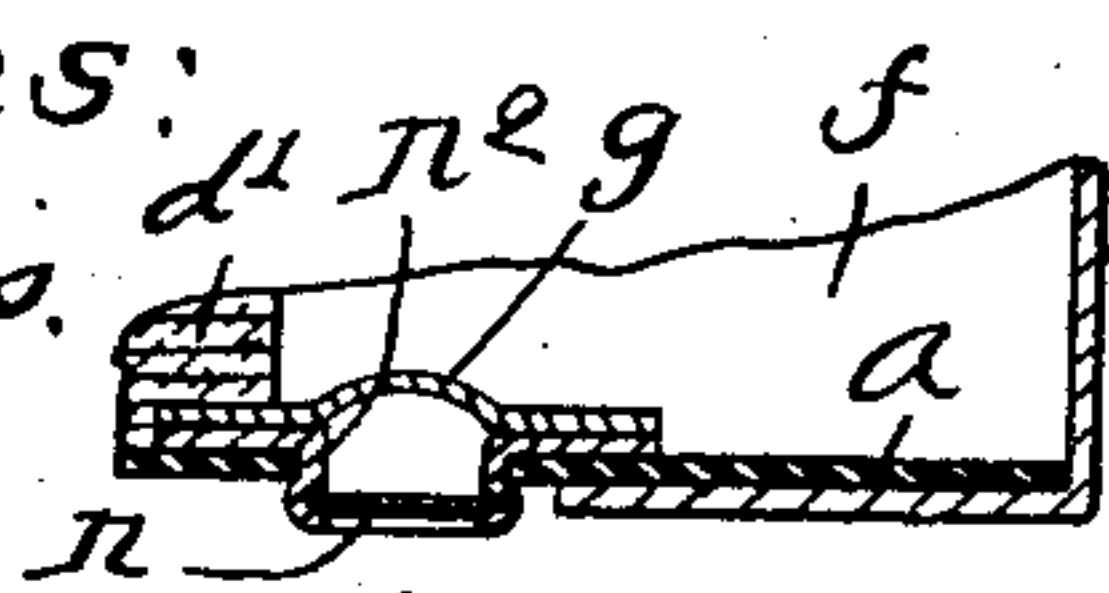


Fig. 8

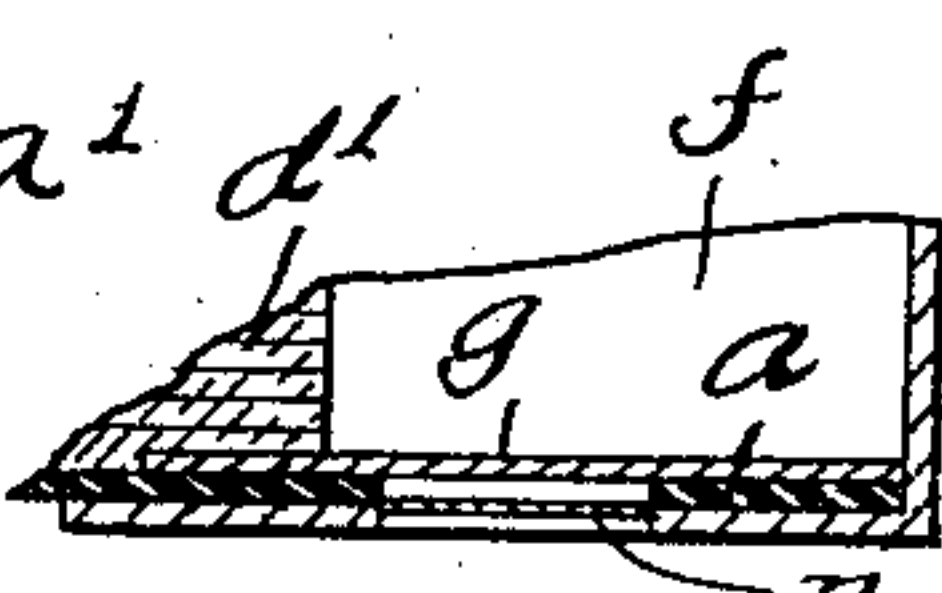


Fig. 9

Inventor:

Harry L. Morse

By B. J. Hayes,

Att'y.

UNITED STATES PATENT OFFICE.

HARRY L. MORSE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO CHASE-SHAWMUT CO., OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

ELECTRIC FUSE OR CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 719,025, dated January 27, 1903.

Application filed February 24, 1902. Serial No. 95,190. (No model.)

To all whom it may concern:

Be it known that I, HARRY L. MORSE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Electric Fuses or Cut-Outs, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to electric fuses or cut-outs, and particularly to that type ordinarily known as "inclosed fuses" or "cut-outs," and has for its object to provide the same with a novel indicating device adapted to be operated directly or indirectly by an increase of pressure within the shell or case containing the fuse or other wire to indicate that said fuse or other wire has been ruptured; also, with an auxiliary indicating device, likewise operated by an increase of pressure within the shell or case; also, with a gas-producing element contained in the shell or case, adapted to be ignited by the arc produced by the rupture of the fuse-wire, whereby the pressure within the shell or case is materially increased.

As an indicating device adapted to be operated by an increase of pressure in the shell or case I may employ an indicating plug or disk normally held in place in a hole in the shell or case, which is ejected therefrom when the pressure is increased.

As an auxiliary indicating device adapted to be operated by an increase of the internal pressure I may employ a flexible piece of material covering a small hole in the shell or case and normally projecting inward, but which when acted upon by an increase of pressure will project outward and protrude from said hole.

As a gas-producing element I may employ a limited quantity of picrate of potassium, and this material may be secured to a strip of asbestos or other material adapted to be wrapped around the fuse or other wire or otherwise held in close proximity thereto, yet I do not desire to limit my invention to the employment of this particular material or to this particular way of holding it in close proximity to the fuse or other wire.

In practice I prefer to provide the shell or case with two closed chambers separated by

a wall which is constructed to permit the passage of a gas through it, or it may be made bodily movable, and I locate the fuse or other wire and the gas-producing element in one of said chambers and the indicating device in the other chamber, although the indicating device may be located at any other part of the shell or case desired.

In some instances the shell or case may be wholly filled with asbestos, magnesia, gypsum, or other material, and in such case no distinct closed chamber provided, yet the gas-producing element and indicating device will be employed, the former being held in close proximity to the fuse or other wire, so as to be ignited by the arc produced by the rupture of said wire, to thereby suddenly increase the pressure within the shell or case and operate the indicating device, which may be located at any part thereof.

Figure 1 shows in side elevation an electric fuse or cut-out embodying this invention. Fig. 2 is a longitudinal vertical section of the fuse or cut-out shown in Fig. 1. Fig. 3 is an enlarged detail view of the fuse-wire gas-producing element and means for holding it in close proximity to said fuse-wire. Fig. 4 is an enlarged detail showing the gas-producing element secured to a piece of asbestos or other material, by which it is held in close proximity to the fuse-wire. Fig. 5 is an enlarged detail of the indicating device and auxiliary indicating device. Fig. 6 is a longitudinal vertical section of an electric fuse or cut-out of a different type, yet embodying my invention. Fig. 7 is a longitudinal vertical section of an electric fuse or cut-out of another type, yet embodying my invention. Fig. 8 is an enlarged detail of a modified form of indicating device, and Fig. 9 is an enlarged detail showing a modified form of auxiliary indicating device.

Referring to Figs. 1 to 4, showing the preferred embodiment of my invention, *a* represents the cylindrical tubular body of the shell or case, which may be of any suitable length and size, and *a'* *a'* the metallic end pieces or caps thereon. *a² a²* represent terminal plates which are secured to said end pieces or caps. *b* is the fuse-wire, which is contained within said shell or case, which is herein shown as a

fusible wire connected at its ends to rods b' , the whole passing through said shell or case lengthwise and connected at its ends to the terminal plates a^2 . As shown particularly in Fig. 2, the ends of the shell or case are packed with asbestos or other material, which is made into the form of plugs, there being two plugs provided, as d d' , separated a short distance to produce a closed chamber e between them.
 5 The fuse-wire passes through these plugs. One of the plugs, as d , is abutted against one end of the shell or case, and the other plug d' is made quite short and is placed in the shell or case a short distance from its end, so that another closed chamber, as f , is produced at the end of the shell or case. The fusible part or portion of the fuse-wire is contained in the closed chamber e , and the indicating device, to be described, is contained in the closed chamber f .
 10 The indicating device (shown in Figs. 2 and 5) consists, essentially, of an indicating plug or disk n , fitted or sprung into a hole in the shell or case. The hole in the shell or case is shown as made through the cap a' and tubular cylinder a , and the plug is pressed inward as far as the junction of the cap and cylinder. The indicating-plug may be simply a piece of quite stiff paper.
 15 The auxiliary indicating device (shown in Fig. 2) consists, essentially, of a piece of flexible material g , as cloth, for instance, secured to the inside of the tubular body, and made of suitable size to more than cover the hole formed or provided in said body a . The flexible material after it has been properly secured is pressed inward more or less, as shown in Fig. 2, by means of a suitable peen. The pressed-in portion of the material g therefore projects more or less into the chamber f in the shell or case, yet being flexible is capable of being pressed outward through the hole in the end piece or cap a' by an increase of pressure within the chamber. The flexible material is more or less foraminous, whereby the pressure may pass through it to a certain extent, yet as the increase of pressure is sudden the pressed-in portion will be forced outward. The pressure within the shell or case is increased when the arc is produced by the rupture of the fuse or other wire; but as the increase in pressure produced solely by the arc is not sufficient to operate the indicating device in all cases means are provided to positively insure a material increase in the pressure when the fuse or other wire ruptures.
 20 In carrying out this part of my invention a gas-producing element is contained in the chamber containing the fuse-wire and is located in such close proximity to said fuse-wire as to be ignited by the arc produced by the rupture of said fuse-wire. The gas-producing element which I prefer to employ consists of a limited quantity of pierate of potassium, this material being one of many which I may use, but preferred on account of having its ignition-point just above the

fusing-point of the fuse-wire, so as to be ignited by the arc produced by the rupture of the fuse-wire and not ignited by any increase of temperature to and including the melting-point of the wire. In applying the gas-producing material I take a single strip of asbestos o and of suitable length to be wrapped around the fuse-wire and smear it on one side with a cementitious substance or compound—as varnish, for instance—and sprinkle a limited quantity of pierate of potassium on the cement-coated side of the strip and then wrap said strip around the fusible portion of the fuse-wire and wind a few turns of wire around the ends to hold it in place. The gas-producing element is thus held in close proximity to the fuse-wire, so as to be ignited by the arc produced by the rupture thereof.

In operation as the arc is produced by the rupture of the fuse-wire and the gas-producing element ignited the gas produced materially increases the pressure within the shell or case, which correspondingly increases the pressure in the chamber f at the end of the shell or case and causes the indicating device to protrude outwardly through the hole in the end piece or cap g . Ordinarily the plug d' will be wound loosely, so as to allow a free passage through it for the gas, yet if wound tightly and driven tightly into the shell or case then it will be moved bodily along in said shell or case like a piston by the pressure in the chamber e when the gas is produced, which action causes a corresponding increase of the pressure in the chamber f . In some instances the device will operate one way, and in other instances the other, and so far as my invention is concerned it is immaterial so long as a pressure is produced and is caused to act directly or indirectly upon the indicating device. As the pressure is suddenly increased the indicating plug or disk will be ejected, and also the pressed-in portion of the flexible material will be forced outward. The auxiliary indicating device is employed to assist in indicating the rupture of the fuse-wire, and particularly in case the plug or disk should be accidentally ejected.

I do not desire to limit my invention to the particular construction of indicating device or auxiliary indicating device herein shown, as it is obvious that it may be modified in many particulars without departing from the spirit and scope of this invention, nor do I desire to limit my invention to the preferred form of fuse or cut-out (shown in Fig. 2) and containing two chambers, as e and f , as other types or forms of fuses or cut-outs already well known may be provided with an indicating device and auxiliary indicating device, and thereby come within the spirit and scope of this invention—as, for instance, the shell or case may be filled with a material such as magnesia, gypsum, or other material, and the fuse-wire embedded therein, as shown in Fig. 6, and the gas-producing element applied to or located in close proximity

to the fuse-wire, as therein shown, and the indicating device and auxiliary indicating device applied to the shell or case at any part thereof, nor do I desire to limit my invention to applying the gas-producing element to a wire which is in the direct circuit, as it may be applied to a shunt-wire, as shown in Fig. 7.

Instead of pressing the indicating-plug into a hole in the shell or case, as shown in Fig. 5, it may be pressed into a thimble or holder n^2 , which is placed in the hole in the shell, as shown in Fig. 8, and, furthermore, instead of pressing inward the central portion of the flexible material, whereby it may serve as an auxiliary indicating device, said material may be stretched tightly over the hole, as shown in Fig. 9, yet, being foraminous, will allow the passage of the gas through it to eject the indicating plug or disk.

What I claim, and desire to secure by Letters Patent, is—

1. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, refractory material contained in said shell or case between the fuse-wire and hole and a removable indicating-plug normally held in said hole and adapted to be ejected by an increase of pressure in said shell or case and a foraminous covering for the hole, substantially as described.

2. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, refractory material contained in said shell or case between the fuse-wire and hole and a removable indicating-plug normally held in said hole and adapted to be ejected by an increase of pressure in said shell or case, and a flexible covering for the hole, substantially as described.

3. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, a removable indicating-plug normally held in place in said hole, and adapted to be ejected by an increase of pressure in said shell or case, and a foraminous covering for said hole, substantially as described.

4. In an electric fuse or cut-out, a shell or case having a chamber within it and provided with a hole outside of said chamber, a fuse-wire contained in said chamber, a removable indicating-plug held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case, and a flexible covering for said hole, substantially as described.

5. In an electric fuse or cut-out, a shell or case having a chamber within it and provided with a hole outside of said chamber, a fuse-wire contained in said chamber, a removable indicating-plug held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case, and a foraminous covering for said hole, substantially as described.

6. In an electric fuse or cut-out, a shell or

case having two chambers within it and provided with a hole in one of said chambers, a fuse-wire contained in the other chamber, a removable indicating-plug held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case, and a flexible covering for said hole, substantially as described.

7. In an electric fuse or cut-out, a shell or case having two chambers within it and provided with a hole in one of said chambers, a fuse-wire contained in the other chamber, a removable indicating-plug held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case, and a foraminous covering for said hole, substantially as described.

8. In an electric fuse or cut-out, a shell or case having two chambers separated by a wall through which the pressure passes and provided with a hole in one of said chambers, a fuse-wire contained in the other chamber, a removable indicating-plug held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case, and a flexible covering for said hole, substantially as described.

9. In an electric fuse or cut-out, a shell or case having two chambers separated by a wall through which the pressure passes and provided with a hole in one of said chambers, a fuse-wire contained in the other chamber, a removable indicating-plug held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case, and a foraminous covering for said hole, substantially as described.

10. In an electric fuse or cut-out, a shell or case having two chambers separated by a movable wall and provided with a hole in one of said chambers, a fuse-wire contained in the other chamber, a removable indicating-plug held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case, substantially as described.

11. In an electric fuse or cut-out, a shell or case having two chambers separated by a movable wall and provided with a hole in one of said chambers, a fuse-wire contained in the other chamber, a removable indicating-plug held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case, and a foraminous covering for said hole, substantially as described.

12. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, a removable indicating-plug normally held in said hole and adapted to be ejected by an increase of pressure in said shell or case, and an auxiliary indicating device at said hole also operated by an increase of pressure in said shell or case, substantially as described.

13. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, a removable indicating-plug normally held in said hole and adapted to be

ejected by an increase of pressure in said shell or case, refractory material contained in said shell or case between the fuse-wire and hole and an auxiliary indicating device at said hole also operated by an increase of pressure in said shell or case, substantially as described.

14. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, a removable indicating-plug normally held in said hole and adapted to be ejected by an increase of pressure in said shell or case, and an auxiliary indicating device at said hole consisting of a piece of flexible material covering said hole and adapted to protrude therefrom when the pressure is increased, substantially as described.

15. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, a gas-producing element also contained in said shell or case, refractory material contained in said shell or case between the fuse-wire and hole, a removable indicating-plug normally held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case, substantially as described.

16. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, a gas-producing element also contained in said shell or case and held in proximity to said fuse-wire, a removable indicating-plug normally held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case, and a foraminous covering for said hole, substantially as described.

17. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, a gas-producing element also contained in said shell or case and held in proximity to said fuse-wire, refractory material contained in said shell or case between the fuse-wire and the hole, a removable indicating-plug normally held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case and a foraminous covering for said hole, substantially as described.

18. In an electric fuse or cut-out, a shell or case, a fuse-wire contained within it, a gas-producing element also contained in said shell or case adapted to be ignited by the arc produced by the rupture of the fuse-wire, an indicating device operated by an increase of pressure in said shell or case, and an auxiliary indicating device also operated by an increase of pressure in said shell or case, substantially as described.

19. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, a gas-producing element also contained in said shell or case, a removable indicating-plug normally held in place in said hole and adapted to be ejected by an increase

of pressure in said shell or case, and an auxiliary indicating device at said hole operated by an increase of pressure in said shell or case, substantially as described.

20. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, a gas-producing element also contained in said shell or case, refractory material contained in said shell or case between the fuse-wire and hole, a removable indicating-plug normally held in place in said hole and adapted to be ejected by an increase of pressure in said shell or case and an auxiliary indicating device at said hole operated by an increase of pressure in said shell or case, substantially as described.

21. In an electric fuse or cut-out, a shell or case provided with a hole, a fuse-wire contained within it, a gas-producing element also contained in said shell or case adapted to be ignited by the arc produced by the rupture of said fuse-wire, an indicating device operated by an increase of pressure in said shell or case, and an auxiliary indicating device at said hole consisting of a piece of flexible material covering said hole and adapted to protrude therefrom when the pressure is increased, substantially as described.

22. In an electric fuse or cut-out, a shell or case, a fuse-wire contained within it, a gas-producing element also contained in said shell or case and secured to a wrapper which is wrapped around said fuse-wire to thereby hold it in close proximity to said fuse-wire, adapted to be ignited by the arc produced by the rupture of said fuse-wire, and an indicating device operated by an increase of pressure in said shell or case, substantially as described.

23. In an electric fuse or cut-out, a shell or case having two closed chambers within it separated by a movable wall, a fuse-wire contained in one of said chambers and a gas-producing element also contained in said chamber adapted to be ignited by an arc produced by the rupture of the fuse-wire, and an indicating device in the other chamber adapted to be operated by an increase of pressure in said chamber, substantially as described.

24. In an electric fuse or cut-out, a shell or case having two closed chambers within it separated by a movable wall, a fuse-wire contained in one of said chambers and an indicating device in the other chamber, said indicating device being adapted to be operated by an increase of pressure in said chamber, substantially as described.

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

HARRY L. MORSE.

Witnesses:

B. J. NOYES,
H. B. DAVIS.