(No Model.)

M. MESTERN.

ELEMENT FOR THERMO ELECTRIC BATTERIES.

No. 398,272. Patented Feb. 19, 1889.

Fig. 1.

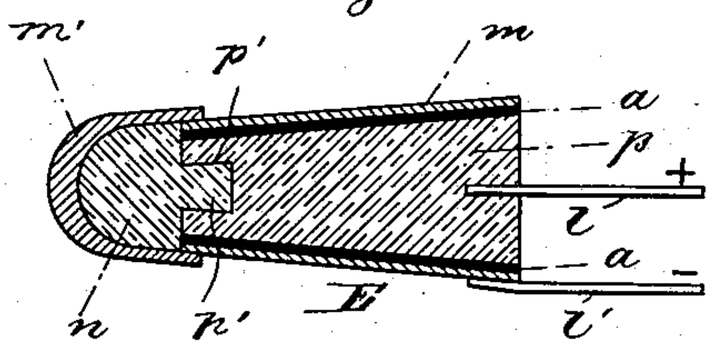


Fig. 2.

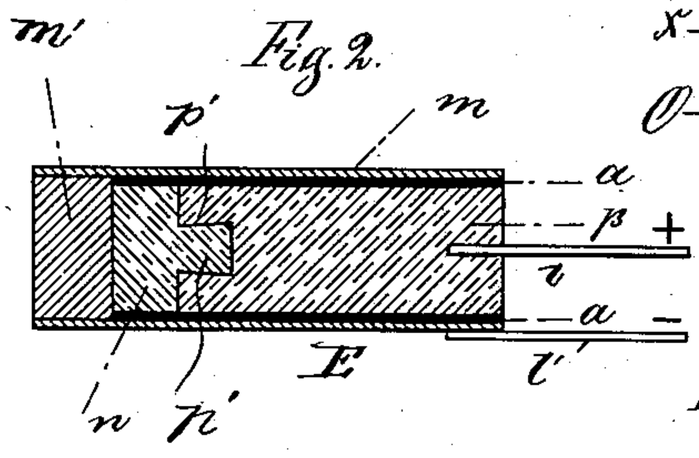


Fig. 3.

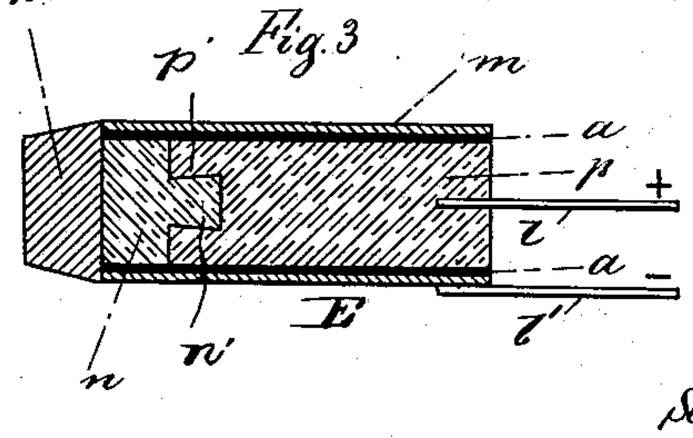


Fig. 4.

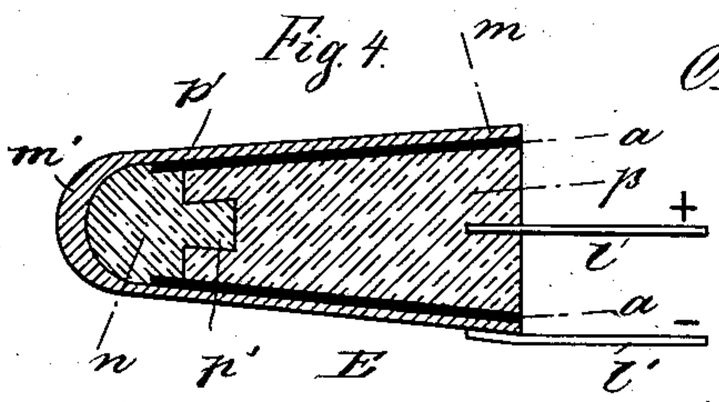


Fig. 5.

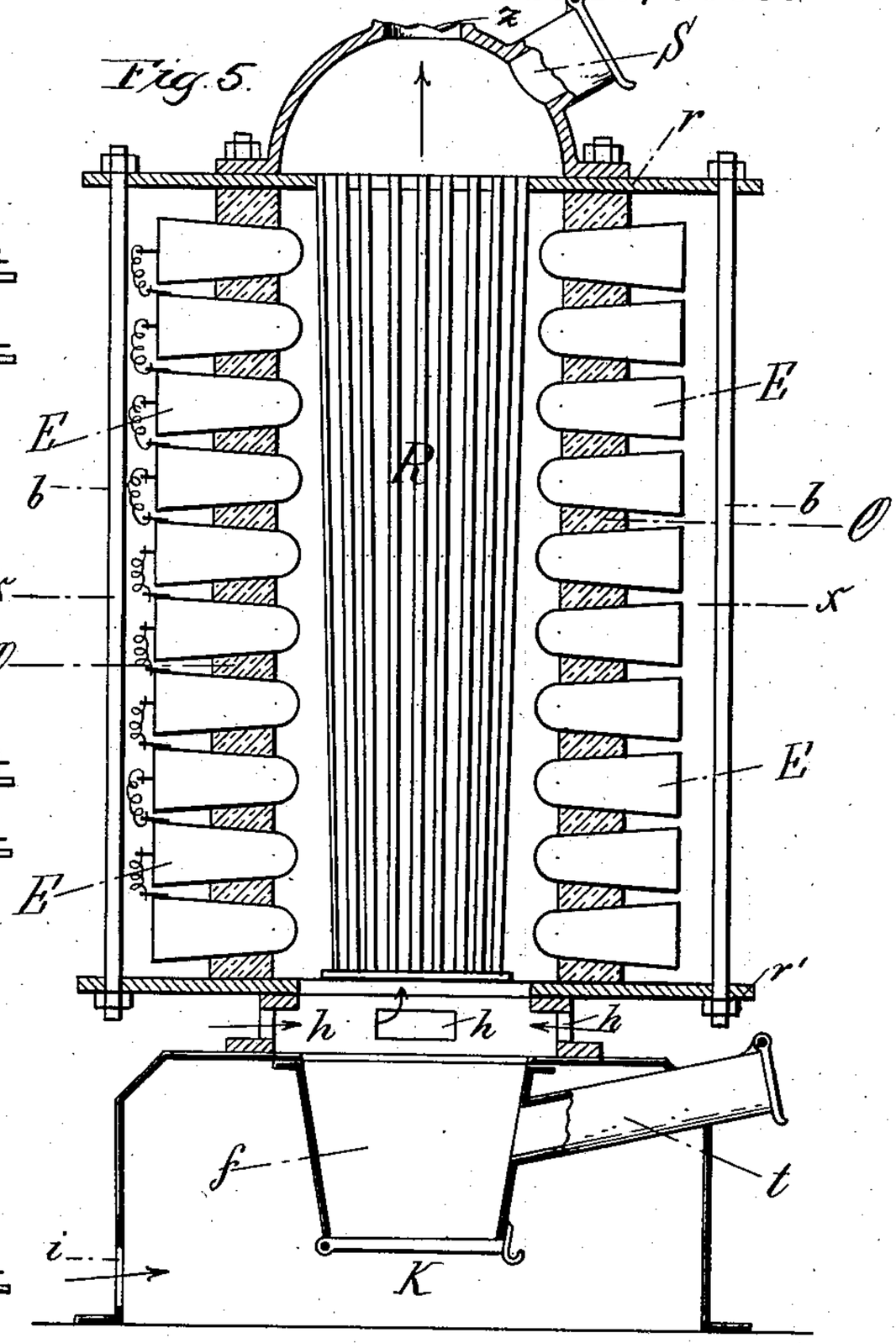
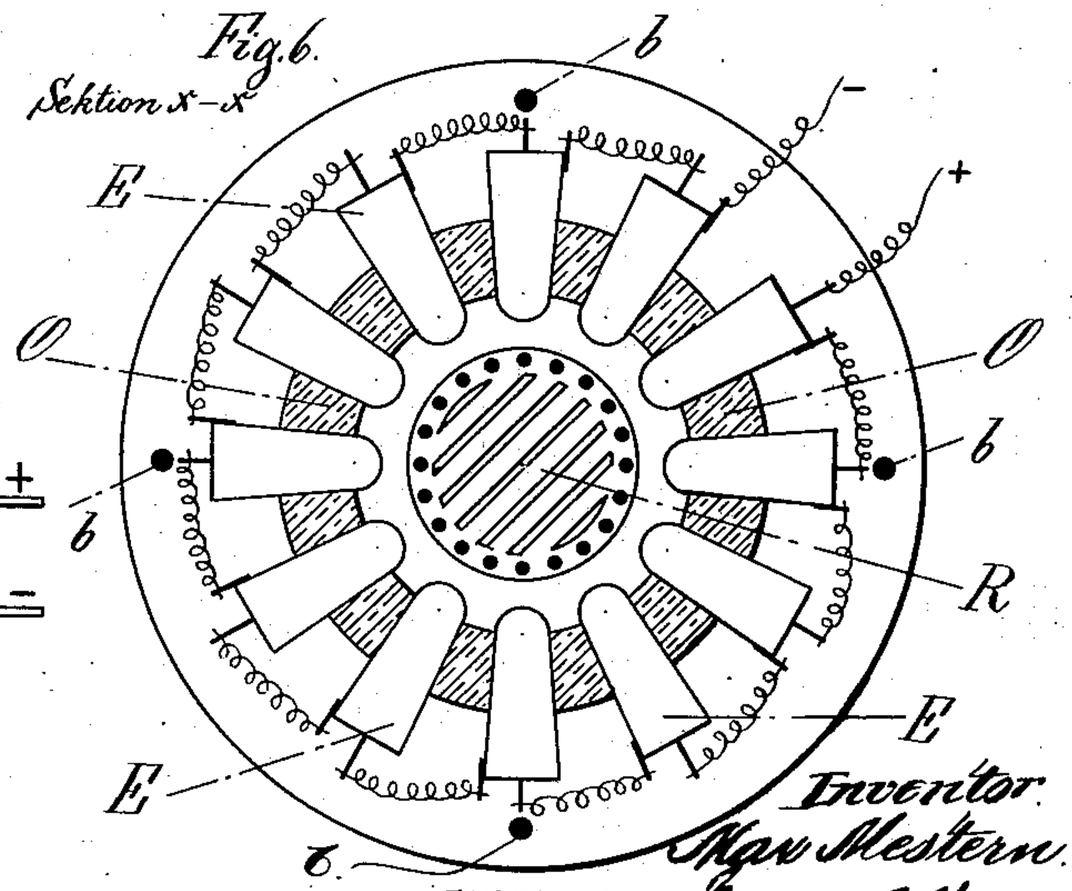


Fig. 6.

Sektion x–x



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UNITED STATES PATENT OFFICE.

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ELEMENT FOR THERMO-ELECTRIC BATTERIES.

SPECIFICATION forming part of Letters Patent No. 398,272, dated February 19, 1889.

Application filed November 22, 1888. Serial No. 291,545. (No model.) Patented in France February 16, 1888, No. 188,764; in Belgium February 16, 1888, No. 80,665; in Italy April 12, 1888, XXI, 23,059, and in Spain June 30, 1888, No. 983/7,983.

To all whom it may concern:

Be it known that I, MAX MESTERN, a subject of the Emperor of Germany, residing at Turin, in the Kingdom of Italy, have invented certain new and useful Improvements in Elements for Thermo-Electric Batteries, (for which patents have been obtained with my knowledge and consent in France, dated February 16, 1888, No. 188,764; in Belgium, dated February 16, 1888, No. 80,665; in Spain, dated June 30, 1888, No. 983/7,983, and in Italy, dated April 12, 1888, No. 23,059, Vol. XXI;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

In the drawings, Figures 1 to 4, inclusive, are vertical longitudinal sections of elements differing slightly in their general construction. Fig. 5 is a vertical axial section of a heater in which a battery made up of my improved elements is arranged. Fig. 6 is a transverse section of the heater, taken about on line *x x* of Fig. 5.

The invention relates to elements for generators of electricity, more especially designed for use in generating electricity by the application of heat, though I do not limit myself to this application.

In the art of generating electricity by means of heat the battery elements as heretofore constructed present many disadvantages, the most serious of which is the perishable nature of these elements, in that they are readily broken as well as readily destroyed when brought in direct contact with the source of heat unless the less effective radiated or transmitted heat is resorted to. Then, on the other hand, interruptions in the electric circuit are liable to occur, owing to the readily-fusible nature of the alloys usually employed for these elements. Practical experience has also demonstrated that where elements as usually constructed are brought in contact with the fuel or the products of combustion such elements are not only rapidly destroyed by the alternating oxidizing and reducing flame and the alloy changed in its nature or composition, but the flame, being a conductor of electricity, an auxiliary or derived circuit is established, that tends to materially impair the effect of the battery.

The object of this invention is to overcome the difficulties referred to; and it consists in the construction of the battery elements substantially as hereinafter described, and as set forth in the claims.

Referring to Figs. 1 to 4, inclusive, *p* indicates the readily-fusible positive electrode, formed of an alloy of antimony and zinc, and *n* is the negative electrode, formed of an alloy of copper and nickel. These two electrodes are firmly connected by a dovetailed tongue-and-groove joint, *n' p'*, respectively. By connecting the electrodes as described I not only obtain a very intimate and firm connection between the electrodes, but also increased contracting surfaces. The electrodes are inclosed in a protective metallic casing, *m*, of iron, nickel, or other metal capable of resisting high temperatures, and between said casing and the electrodes I interpose a lining, *a*, of a fire-proof composition or material, preferably asbestus, that serves to isolate the electro-positive alloy from its inclosing-casing. As shown in Fig. 4, the casing inclosing the electrodes may be made of a single piece, the end or cap *m'* being re-enforced to better protect the electrodes against heat; or said cap *m'* may be a separate or distinct portion of the casing, as shown in Fig. 1, the cap serving also as a means for holding the casing; or it may take the form of a plug, as shown in Figs. 2 and 3, which serves as a conductor of heat. The connecting-strips *l* and *l'* are formed of an alloy of nickel and copper, and are secured to the positive electrode and to the metallic casing *m*, which is in direct contact with the negative electrode either through the cap *m'* or through the plug *m'*.

By means of the construction described I obtain an element, E, having that electrode which is more directly exposed to the action of the heat of an alloy of greater refractory power than the alloy of the other electrode, thus laying it less liable to speedy destruction. On the other hand, both electrodes being protected by the inclosing-casing and the

more fusible electrode by the addition of a fire-proof lining, while the electrode subjected to the action of greatest heat has the additional protection of cap or plug *m'*, their speedy destruction is effectually guarded against; hence the more fusible electrode is not liable to be melted, and thereby destroy the circuit; but should the temperature become such as to result in a partial fusion of the positive electrode the circuit will not be destroyed, owing to the intimate connection between the two electrodes.

As shown in Figs. 5 and 6, a number of the described elements are arranged in battery within a cylindrical stove or heater, O, having axially arranged therein a basket-grate, R, of cylindro-conical form.

The heater, according to the uses made thereof, is constructed of asbestus, porcelain, or other non-conductor of heat and electricity, and is so arranged that any one of the elements E that constitute the battery may be readily removed from its bearings whenever this becomes necessary.

S is the feed-hopper for the stove; *z*, the smoke-pipe; *f*, the ash-pit, which here serves as a fire-pot, and is provided with a tilting grate, K, the fuel being fed to the fire-pot through feed-pipe *t*.

The air necessary to the combustion is admitted through ports *h* and *i*, Fig. 5; and *r* and *r'* are the top and bottom plates, that serve to secure the heater-body through the medium of the tie-rods *b*.

I have shown a convenient way of arranging the elements of the battery concentrically with the axis of the heater; but this arrangement need not necessarily be adhered to, as it may be varied.

Having described my invention, what I claim is—

1. An element for thermo-electric batteries, comprising a positive and negative electrode in contact with each other, a metallic inclosing-casing of greater refractory power than that of the electrodes, and a fire-proof non-conductive lining arranged to isolate one of said electrodes from the casing, substantially as and for the purposes specified.

2. An element for thermo-electric batteries, comprising a positive and negative electrode in contact with each other, a metallic inclosing-casing of greater refractory power than that of the electrodes, a cap or plug of greater thickness than the casing for the smaller end of the element, and a fire-proof non-conductive lining arranged to isolate one of said electrodes from the casing, substantially as and for the purposes specified.

3. An element for thermo-electric batteries, comprising two electrodes composed of alloys of metals of varying refractory power, that electrode more directly exposed to the heat being formed of an alloy of greater refractory power than that of the other electrode, in combination with a conductive sheathing constructed of a metal of greater refractory power than either of the electrodes, and a fire-proof lining interposed between said sheathing and the more fusible electrode, substantially as and for the purposes specified.

4. An element for thermo-electric batteries, comprising two electrodes composed of alloys of metals of varying refractory power, that electrode more directly exposed to the heat being formed of an alloy of greater refractory power than that of the other electrode, in combination with a conductive sheathing constructed of a metal of greater refractory power than either of the electrodes, said sheathing being re-enforced at that point which is more directly exposed to the heat, and a fire-proof lining interposed between said sheathing and the more fusible electrode, substantially as and for the purposes specified.

5. An element for thermo-electric batteries, comprising a positive electrode formed of an alloy of antimony and zinc, and a negative electrode formed of an alloy of copper and nickel, in combination with an inclosing-casing of a conductive metal of greater refractory power than that of either of the electrodes, and a fire-proof insulating-lining interposed between said casing and the positive electrode, substantially as and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses.

MAX MESTERN.

Witnesses:
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