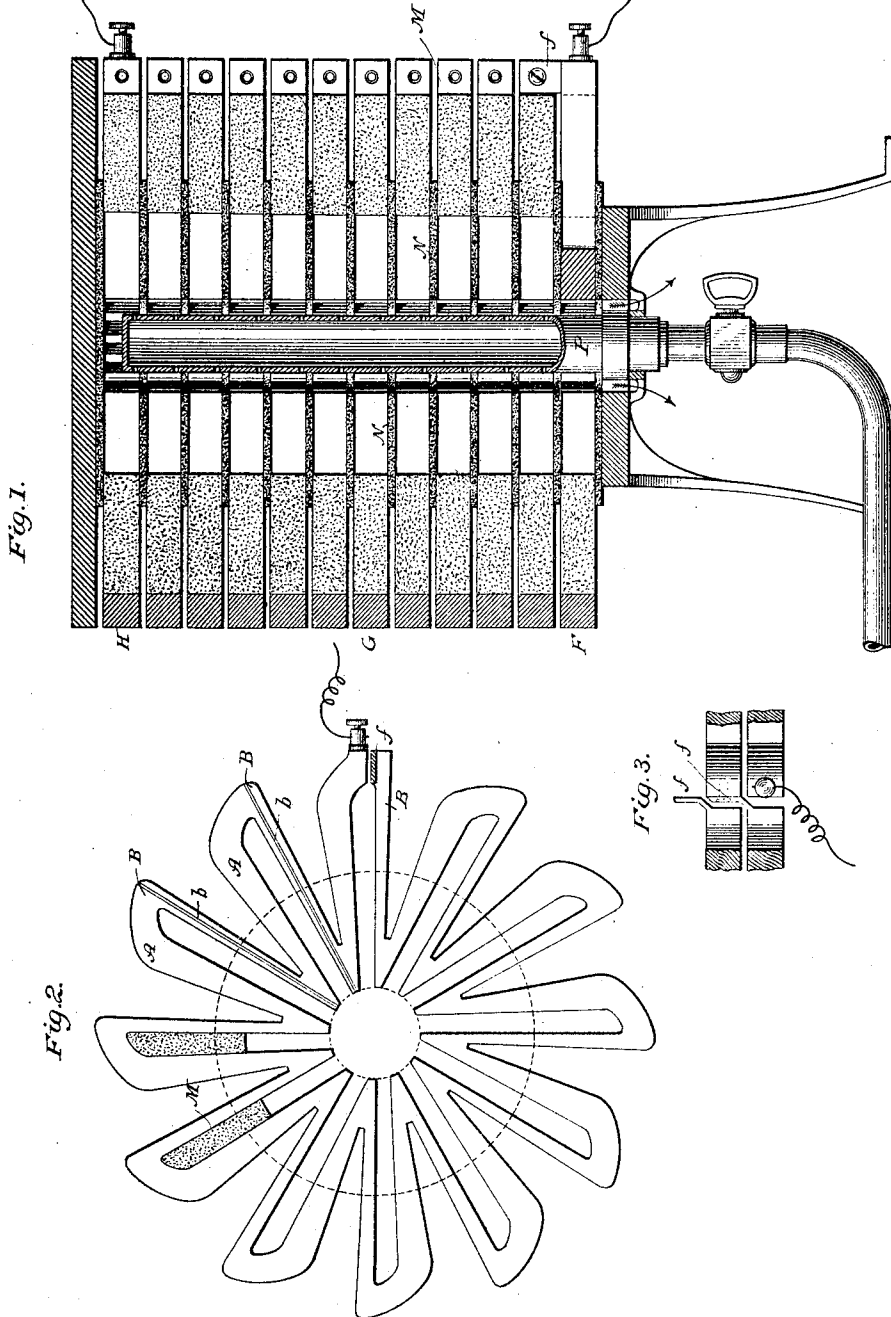


(No Model.)

A. K. EATON.
THERMO ELECTRIC BATTERY.

No. 289,631.

Patented Dec. 4, 1883.



Attest:
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UNITED STATES PATENT OFFICE.

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THERMO-ELECTRIC BATTERY.

SPECIFICATION forming part of Letters Patent No. 289,631, dated December 4, 1883.

Application filed January 6, 1883. (No model.)

To all whom it may concern:

Be it known that I, ASAHEL K. EATON, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Thermo-Electric Batteries, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

It is well known that when the junctions of a circuit made of two metals are at different temperatures a current of electricity generally flows through the circuit. It is also a recognized fact that a current may flow even when one metal only is used, provided it appear under different molecular conditions.

The main object of my invention is to produce a practicable and durable thermal pile in which this property may be utilized, and for this purpose I form a series of elements of the same metal, but alternately hard and soft, by using for said elements chilled and unchilled metal. In this my invention chiefly consists, though it involves additional features of novelty and importance—viz., a thermal pile with elements of chilled and unchilled iron, and a series of elements consisting of molded or cast sections or blocks, and composed of alternate sections of hard or chilled and soft or unchilled metal.

The accompanying drawings illustrate my invention embodied in a practicable and efficient form.

Figure 1 is a vertical central section of a battery of elements; Fig. 2, a plan view of one of the groups composing said battery; and Fig. 3, a detached portion of Fig. 1, showing the connection from one group of elements to another.

The elements are formed in circular groups, one of which is shown in Fig. 2, A A being the soft-iron or electro-positive elements, and B B the chilled-iron or electro-negative elements. The method of producing these groups of elements is as follows: A mold is prepared in the usual manner. The spaces corresponding to the elements A are left clear; but in the remaining spaces, or those which correspond to the elements B, strips of wrought or sheet iron are placed. When the iron is poured into the mold, the strips of sheet-iron chill the elements B, so that when removed from the mold

they are much harder than the elements A. The strips of sheet-iron should be inserted in the molds in such positions that they will occupy the center of the chilled elements, as indicated in Fig. 2, where the dark line *b* indicates the iron strip in the completed element. The arrangement of the elements, it will be understood, is purely arbitrary, though, for some reasons, the specified shape of the casting is the best, the molding being rendered quite easy, and the junctions of the elements being brought into the most favorable positions for the application of heat to one set and of cool air to the other. If the first and last elements of a group such as just described be provided with binding-posts and connected by a wire, or otherwise, and heat applied to the junctions at the center, a current will be developed which flows in the elements from the soft-iron or electro-positive elements to the hard-iron or electro-negative elements through the heated joints. The electro-motive force producing the current in this or similar piles being comparatively low, it is usually necessary to employ a considerable number of elements in series. For this purpose I construct a battery consisting of a number of the groups described, placed one above the other, and connected up by joints formed in any suitable way between the ends of the last soft-iron element of one group and the first hard-iron element of the group next above or below. I also employ means of insulating the groups and of increasing the differences in temperature between the inner and outer junctions, the nature of which will be described by reference to Fig. 1. On a suitable stand or base any desired number of the circular groups (designated F G H, &c.) is placed. The groups or plates are separated a short distance by rings of infusible insulating material N, which may be composed of asbestos-paper caused to adhere by a paste of silicate of soda. The interior spaces between the soft and hard elements of each group are filled in with an infusible insulating substance, (designated by the letter M.) A good material for this purpose is a mixture of ground quartz or asbestos with silicate of soda. The last hard element of each group has an ear or lug, *f*, projecting from its end, which is bolted to the soft element, which forms the terminal of the group next above

or below, as the case may be. All the groups are connected up in series in this manner. This method of connection, however, is an arbitrary one, as other means may be employed—
 5 as, for instance, binding-posts may be joined to the terminal elements of each group, so that the whole may be coupled in series or for quantity by separate connections or wires. In the
 10 central space extending up through the series of plates or groups is placed a perforated gas-pipe, P, or any other form of heater—such as an iron or black-lead fire-box—with a space
 15 around it, down which the heated air may be drawn. The battery and the heating and cooling arrangements may evidently be constructed in many other ways.

The specific construction and method of manufacture now described may be varied in many ways. For example, in lieu of using
 20 iron, I may use other metals—such as steel, copper, or brass—and in place of forming the series or groups in the manner set forth I may cut each section separately and unite them in any proper manner.

25 I am aware that heretofore a metallic wire hardened by drawing and then softened at intervals by the application of heat has been employed in demonstrations of the property or principle upon which this invention is based;
 30 but in such cases it is evident that the requirements of a practicable battery are not fulfilled, inasmuch as the cross-section of the elements is necessarily very small, while the metal is in

such condition that the application of heat brings both elements to the same molecular
 35 condition, and thus destroys their capability of generating current. By my invention, however, blocks or sections of large size and convenient shape may be produced, which are not injuriously affected by the application of
 40 heat.

The methods of producing the batteries described are not claimed herein, as I intend making the same the subject of other applica-
 45 tions.

What I claim is—

1. A thermal pile the elements of which are composed of chilled and unchilled metal, as herein set forth.

2. A thermal pile the elements of which are composed of alternate blocks of chilled and unchilled metal, as described.

3. A thermal pile the elements of which are composed of chilled and unchilled iron, respectively, as set forth.

4. A series or group of electro-thermal elements cast in one piece and composed of alternate sections of chilled and soft iron, substantially as described.

In testimony whereof I have hereunto set
 my hand this 2d day of January, 1883.

A. K. EATON.

Witnesses:

F. L. GAYLORD,

W. L. RIANHARD.