

No. 704,596.

C. B. THWING.

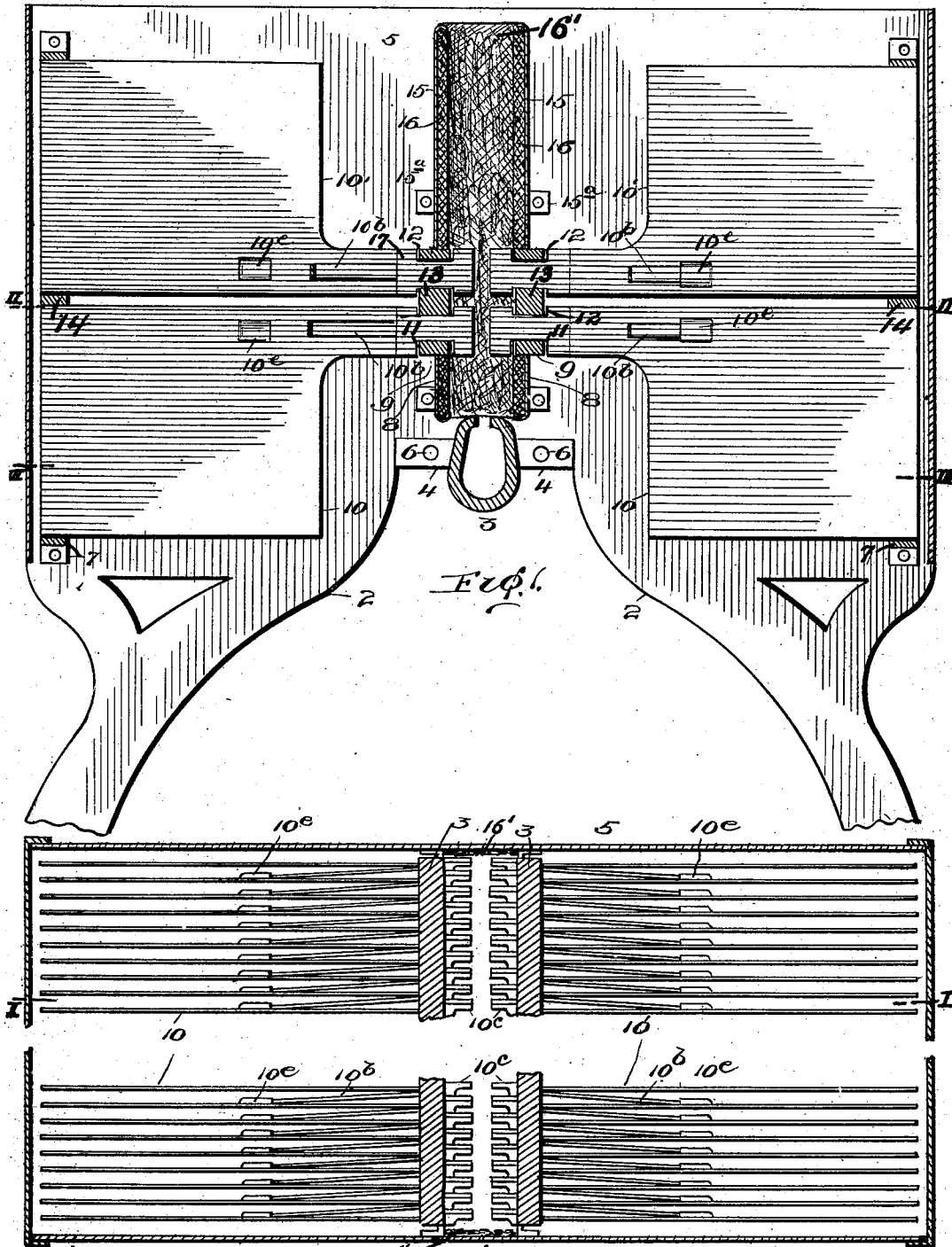
Patented July 15, 1902.

THERMO-ELECTRIC GENERATOR.

(Application filed Oct. 21, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
J. M. Fowler
Albert P. Harris

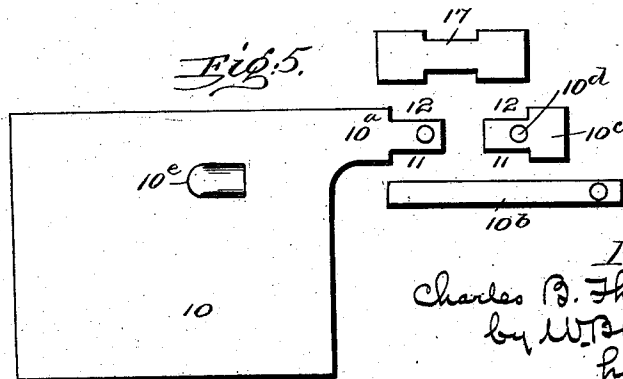
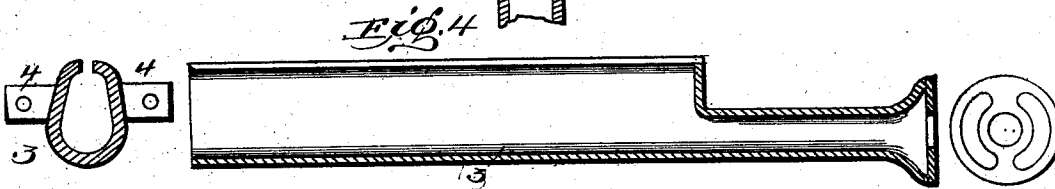
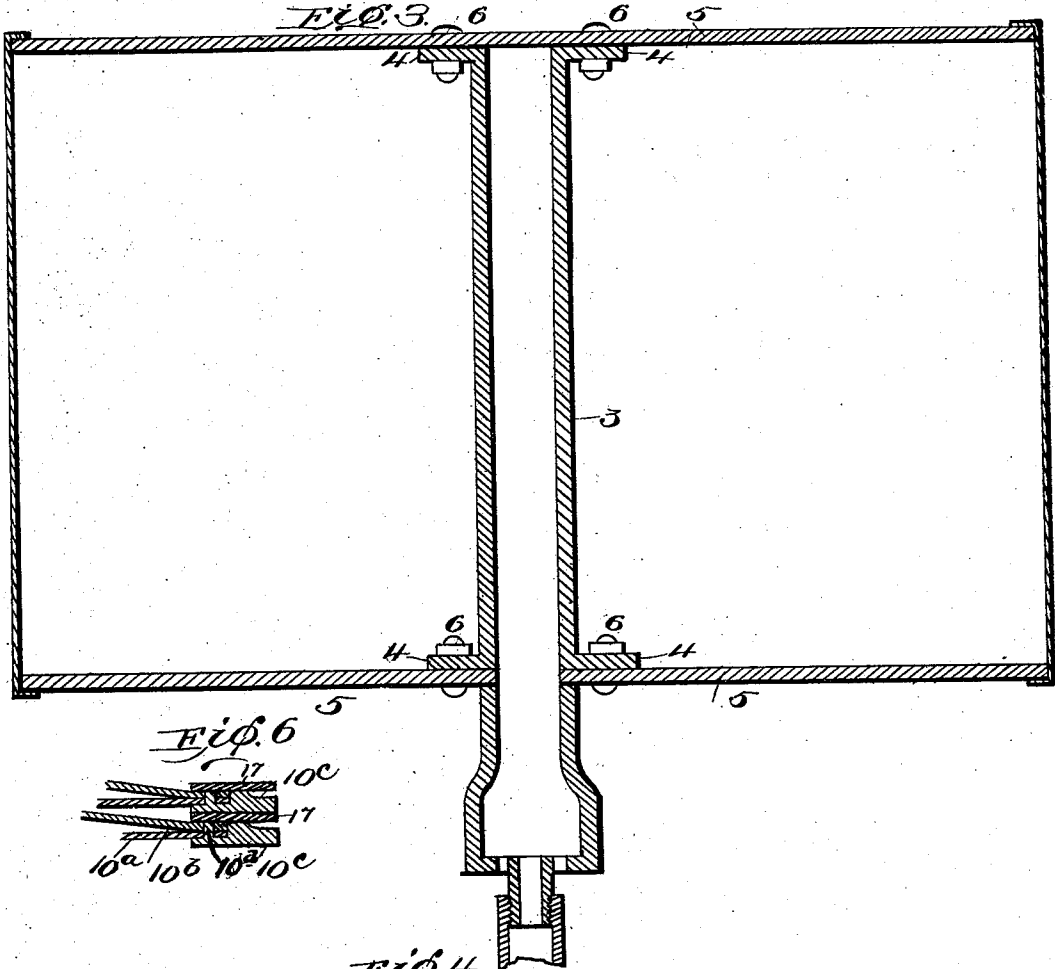
Inventor
Charles B. Thwing
by W. B. Corwin
his Att.

C. B. THWING.
THERMO-ELECTRIC GENERATOR.

(Application filed Oct. 21, 1901.)

(No Model.)

2 Sheets—Sheet 2.



witnesses:
J. M. Fowler Jr.
Albert Popkema

Inventor:
Charles B. Thwing
by W. B. Corwin
his Att'y.

UNITED STATES PATENT OFFICE.

CHARLES B. THWING, OF SYRACUSE, NEW YORK, ASSIGNOR TO LOUIS S. LANGVILLE, OF NEW YORK, N. Y.

THERMO-ELECTRIC GENERATOR.

SPECIFICATION forming part of Letters Patent No. 704,596, dated July 15, 1902.

Application filed October 21, 1901. Serial No. 79,433. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. THWING, of Syracuse, in the county of Onondaga and State of New York, have invented a new, original, and useful Improvement in Thermo-Electric Generators, of which the following is a specification.

My invention relates to improvements in the construction of electric generators in which the current is generated by variations in the temperature of thermo-electric couples and ordinarily by the action of heat from a burner upon one portion of such couples, while the other portion thereof is left or maintained comparatively cool.

The objects of my invention are to provide a simple, exceedingly-compact, and highly-efficient thermo-electric generator constituted of materials and with the elements assembled in such relation to each other and to the generator as an entirety as to give a higher efficiency than has heretofore been obtained with the expenditure of a given amount of fuel and space.

I shall now describe my invention, so that others skilled in the art to which it appertains may manufacture and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical longitudinal section of my improved thermo-electric generator on the line I I of Fig. 2. Fig. 2 is a horizontal cross-section of the same on the line II II of Fig. 1. Fig. 3 is a horizontal cross-section on the line III III of Fig. 1, the thermo-electric elements being omitted. Fig. 4 is a detail view of the burner detached. Fig. 5 is a detail view of the parts constituting one of the electric couples, showing also a side view of the insulator which I employ at the heating-joints to insulate the couples from each other. Fig. 6 is a detail view in section of two couples at the heating-joint.

Like symbols of reference indicate like parts in each.

In the drawings, 2 indicates the burner frame or stand carrying the burner 3, the burner being provided with flanges 4 4, by which it is secured to the sides 5 5 of the generator-casing by bolts 6 6, the sides 5 5 being suitably connected to or forming part of the

burner-frame 2. At the top along each outer edge of the frame 2 is arranged a strip 7 of insulating material, and supported by rods or plates 8, also bolted to the sides 5 5, are insulating-strips 9 9. Supported by and resting on the insulating-strips 7 and 9 in two series, one at each side of the burner 3, is one set of the thermo-electric couples 10 of the generator, each couple of said series being provided with a recess 11, fitting over the insulating-strip 9. Each of the couples is also provided with a recess 12 on its upper edge, in which is set an insulating-strip 13. A second set of couples 10' in two series, one on each side of the burner, but reversely arranged and similarly provided with recesses 11 and 12, is placed on the insulating-strips 13, the two sets being separated at their ends by strips 14 of insulating material.

The chimney of the burner is formed of two plates 15 15, bolted to the sides 5 of the casing by means of flanges 15^a. Each side of the chimney 15 is provided on the interior surfaces with a layer of asbestos 16, which is for the purpose of preventing as much as is possible radiation of heat through the chimney sides into the outer portions of the generator. The portions of the sides 5 5 within the burner-chamber are also provided with a layer of asbestos 16'.

Each of the thermo-electric couples 10 10' is constructed as follows: It has a body portion and a laterally-projecting narrow wing 10^a, composed of one metal or alloy, preferably iron or steel or an alloy thereof in which iron or steel predominates. 10^b is the other element of the couple, composed, preferably, of an alloy of nickel and copper of the chemical composition Ni₃Cu₂. 10^c is a connecting or heating piece for connecting the elements 10^a and 10^b of the couple together at the joint intended to be heated. The connecting-piece 10^c is provided with a projecting rivet 10^d. To assemble the parts together, the part 10^a is placed on the piece 10^c, the rivet 10^d projecting through a suitably-shaped hole therein. Then the strip 10^b is placed on the part 10^a, the hole in the strip fitting over the rivet. The three parts are then riveted and preferably brazed together by brass or other copper alloy, or they may be electrically welded together.

Each of the elements 10 10' has a struck-up portion 10^c, into which fits and is brazed the end of the strip 10^b of the adjoining couple.

- 17 is a piece of mica or other suitable material placed between each two adjoining couples at the heating-joint for the purpose of insulating the couples at that point from each other.

The advantages of my invention will be appreciated by those skilled in the art. The generator is cheap in construction, high in efficiency, compactly arranged, and consumes but little fuel. By reason of the construction of the elements and the reverse arrangement of the sets thereof relatively to each other the portions to be heated or the joints are compact and brought near to one another and close to the flame, leaving the comparatively much larger portions of the elements in the path of cooling-currents of air passing up through the generator between the outer sides of the casing and the chimney, the casing being left open at the top and bottom for this purpose.

- Modifications may be made in the construction of the various parts and in their relative arrangement without departing from the spirit of the invention, since

What I claim is—

1. In a thermo-electric generator, a casing open at top and bottom, a burner, a chimney for said burner, and thermo-electric couples the joints of which project into the path of the products of combustion from said burner, the major portions of the couples being located in the casing beyond the burner; substantially as described.

2. In a thermo-electric generator, a casing open at top and bottom, a longitudinal burner, a chimney for said burner, and thermo-electric couples on each side of said burner the joints of which project into the path of the products of combustion from said burner, the major portions of the couples being located in the casing outside the chimney; substantially as described.

3. In a thermo-electric generator, a burner, a casing, insulating-strips supported by the casing, and thermo-electric couples supported by said insulating-strips and having their joints to be heated situate in the path of the products of combustion from the burner; substantially as described.

4. In a thermo-electric generator, a casing open at top and bottom, a longitudinal burner, a chimney for said burner, two sets of thermo-electric couples on each side of said burner, said sets having insulating-strips between their members and between each other, the strips, chimney and sides of the casing forming a heating-chamber above the burner, the joints of the couple to be heated projecting into said heating-chamber; substantially as described.

5. In a thermo-electric generator, a casing, a burner, a series of thermo-electric couples having their minor portions as to size con-

stituting the joints to be heated projecting into the path of the products of combustion from said burner, and their major portions extending outwardly from and below the minor portions so as to constitute small compact heating-surfaces and wide extended cooling-surfaces; substantially as described.

6. In a thermo-electric generator, a casing, a burner, a series of thermo-electric couples having their minor portions as to size constituting the joints to be heated projecting into the path of the products of combustion from said burner, and their major portions extending outwardly from and below the minor portions, and a second series of couples similarly constructed arranged above said first series but reversely thereto, so as to constitute small compact heating-surfaces and wide extended cooling-surfaces; substantially as described.

7. In a thermo-electric generator, a casing, a longitudinal burner, a longitudinal series of thermo-electric couples arranged on each side of said burner and having their minor portions as to size constituting the joints to be heated projecting into the path of the products of combustion from the burner and their major portions extending outwardly from and below the minor portions, and two series of couples similarly constructed arranged above said first two series but reversely thereto, so as to constitute small compact heating-surfaces and wide extended cooling-surfaces; substantially as described.

8. In a thermo-electric generator, a lower series of couples the positive elements of which are in the form of wings projecting outwardly and downwardly from the joints to be heated, and an upper series of couples similarly shaped but reversely arranged with respect to the lower series, so as to constitute small compact heating-surfaces and wide extended cooling-surfaces; substantially as described.

9. In a thermo-electric couple, a metallic positive element, and a metallic negative element differing in composition from the positive element, the two elements being riveted and brazed together at the joint by brass or other copper alloy; substantially as described.

10. In combination, a thermo-electric couple having a slot in one of its elements, and a second couple having a portion of one of its elements interfitting with said slot, the two parts being brazed together at the joint; substantially as described.

11. In a thermo-electric generator, a couple having a heating-joint composed of positive and negative elements riveted to a connecting-piece; substantially as described.

12. In a thermo-electric generator, a couple having a heating-joint composed of positive and negative elements riveted and brazed to a connecting-piece; substantially as described.

13. In a thermo-electric generator, a thermo-electric couple, the positive element of which has a wide extended body or cooling

portion and a narrow portion to be heated extending therefrom, said heating portion being provided with a groove or grooves adapted to fit over insulating-strips on the generator-casing; substantially as described.

14. In a thermo-electric generator, a casing open at top and bottom, a longitudinal burner, a chimney for said burner, and two sets of thermo-electric couples on each side of said burner, said sets having insulating-strips between their members and between each other, the strips, chimney, and sides of the casing

forming a heating-chamber above the burner, said heating-chamber being lined with asbestos and the joints of said couples to be heated projecting into the chamber; substantially as described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES B. THWING.

Witnesses:

F. A. SAUNDERS,

E. A. EMENS.