

(No Model.)

H. B. COX.
THERMO-ELECTRIC GENERATOR.

No. 561,657.

Patented June 9, 1896.

Fig. 1.

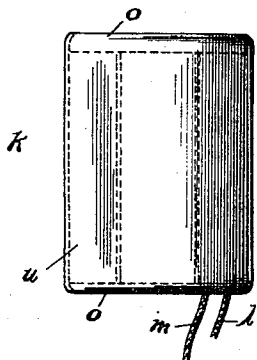
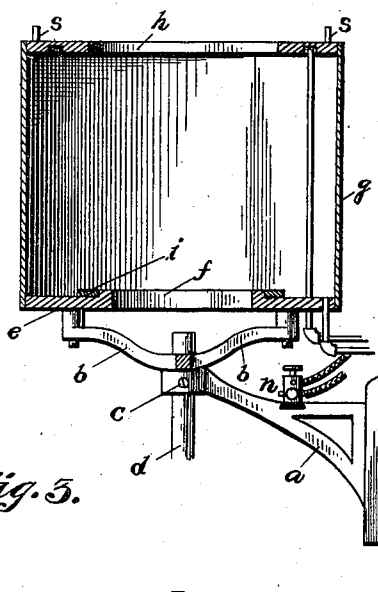


Fig. 3.

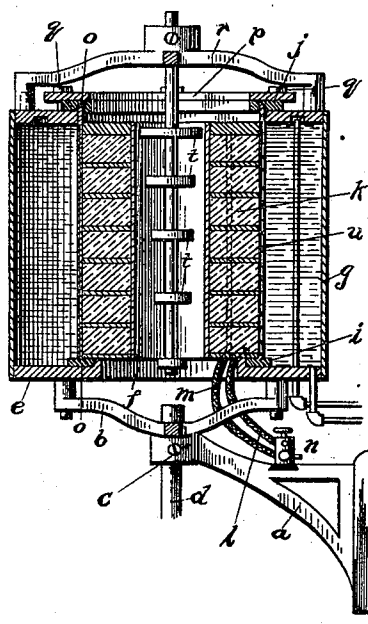


Fig. 2.

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HARRY BARRINGER COX, OF HARTFORD, CONNECTICUT.

THERMO-ELECTRIC GENERATOR.

SPECIFICATION forming part of Letters Patent No. 561,657, dated June 9, 1896.

Application filed February 13, 1895. Serial No. 538,262. (No model.)

To all whom it may concern:

Be it known that I, HARRY BARRINGER COX, of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Thermo-Electric Generators; and I do hereby declare that the following is a full, clear, and exact description of the invention, which 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 the letters of reference marked thereon, which form part of this specification.

This invention relates to certain improvements in thermo-electric generators.

The object of the invention is to provide an improved thermo-electric generator wherein the active working current-generating element, *per se*, is easily removable from the supporting parts and framework, so that the active part can be easily removed and replaced at a minimum cost without in any way injuring or marring the frame supporting or inclosing parts.

A further object of the invention is to provide certain improvements in details of construction and arrangements of parts whereby a highly efficient and practically and economically successful thermo-electric generator can be produced and maintained at a minimum cost.

The invention consists in certain novel features of construction and in combinations of parts more fully and particularly described hereinafter, and pointed out in the claims.

Referring to the accompanying drawings, Figure 1 is a vertical section of the casing and supporting part of a thermo-electric generator, the active element of the generator being removed. Fig. 2 is a similar view of the generator complete with the active element clamped in place therein. Fig. 3 is a detail elevation of an active element, *per se*, removed from its casing and such as is shown in place in the casing and in section in Fig. 2.

In the drawings, *a* is a supporting-bracket formed to be secured to the side of a vertical support and extend laterally therefrom. At its outer end this bracket is provided with the radiating and upwardly-extending arms *b*. At the center from which these arms radiate the bracket has the central vertical

opening and clamping-screw *c* to receive the gas-burner *d*, of any suitable and desirable construction.

Although I have thus specifically described a satisfactory form of supporting device for the parts hereinafter set forth, yet I do not limit myself to any particular form of support, as any suitable and desirable support can be employed.

e is the bottom ring or annulus of the inclosing and supporting casing for the active element of the generator. This annulus rests on and is securely bolted to the upper ends of said radiating arms of the bracket. Around its open center this annulus is provided with the upturned annular flange *f*.

The inclosing cylindrical outer wall or jacket *g* extends up from the outer edge of this annulus-bottom, and is rigidly and tightly secured at its lower edge around the outer edge of said bottom or can be formed integral therewith, if desirable. At its upper edge this inclosing wall has the ring or annulus-top *h* extending in from its top edge and forming a tight joint or formed integral with the top end of the inclosing wall. The central opening of this top is larger in diameter than the central opening of the bottom of the case—that is, the bottom opening is less, while the top opening is greater, than the diameter of the active element.

i is a gasket or ring of packing material, such as rubber or other suitable material, resting on the upper surface of the bottom of the casing, embracing the central flange thereof around the central opening.

j is an approximately similar gasket or packing-ring resting on the upper surface of the annulus-top of the casing when the active element is therein and projecting over the same.

k is the active or generating element of the generator formed in the shape of a hard open cylinder built up of the rings of thermo-couples, the rings being arranged one above the other with insulating material between, all the rings being properly electrically connected.

l is the offtake flexible conductor from the bottom ring, and *m* is the offtake from the top ring and opposite pole of the generator. This top conductor is properly connected with the end element of the top ring and brought down through the generator between the op-

posite poles of each ring and insulated therefrom, so that both conductors extend out through the bottom of the generator.

In building the thermopile or active element after the rings have been properly arranged and connected the entire cylinder is coated and filled in between the elements and rings with a plastic refractory compound which can be hardened, so that a hard rigid cylinder is formed. A covering *n*, of sheet metal, is placed around the cylinder and intimately united therewith or secured thereto, with its ends *o o* projecting slightly beyond the ends of the cylinder and slightly turned, beaded, or spun in, as shown, if desired, but not necessarily. This removable thermopile, complete in itself, constitutes the active element mentioned therein.

The active element is placed in the casing with the lower end thereof resting on the flange of the casing-bottom and extending inwardly beyond the same, so that the bottom projecting metal edge *o* passes into the bottom packing-gasket and presses the same against said flange, casing-bottom, and cylinder, so as to form a most water-tight joint.

The upper end of the cylindrical active element fits snugly within the top of the casing with the top gasket on its upper projecting edge *o*. A top clamping-ring *p* is provided extending partially over the casing-top and the upper end of the cylinder and resting on the top packing-gasket. Removable screws *q* pass through this ring and into the casing-top. When said screws are screwed into the casing, the top gasket is compressed and expanded between the clamping-ring and casing-top and is pressed down around edge *o*, embedded in the same, and thereby forms a water-tight joint between the active element and top of the casing, while the cylinder is also secured and held.

r is a light spider-frame to rest on the casing-top and having vertical sockets in the ends of its arms to removably rest on the vertical pins *s* from the casing-top. This spider has the central depending rod extending down into the center of the generator-cylinder and carrying the graduated deflectors *t*. This spider is placed in position after the active cylinder has been properly set and secured by the clamping-ring *p* and is easily lifted from its position and laid to one side when the cylinder is to be removed.

On its upper side the supporting-bracket is provided with two double binding-posts *n*, (one only can be seen in the drawings,) insulated from each other and from the bracket, so that the two terminal conductors pass from the bottom of the cylinder out through the open bottom of the casing and are removably secured to their respective binding-posts, which also have the exterior openings and clamps for the wires of the working lines.

When it is desired to remove the active element, for any reason, from the complete device, the spider-frame *r*, with the deflect-

ors, is lifted from the casing and cylindrical active element, the screws *q* are loosened, and the clamping-ring *p* and the gasket *j* are lifted from the device. The terminal wires *l m* are loosened from the binding-posts *n*, and the active element can then be lifted bodily from the casing out through the open top thereof with the terminal wires hanging loosely therefrom.

It will be readily understood that the outer metal-coated wall of the active cylinder and the casing forms the water-jacket around the generator-cylinder, the casing having the water inlets and outlets, and the opposite ends of the active cylinder form water-tight joints with the casing ends.

The heat from the gas-burner passes centrally up through the open center of the cylinder, and is equally diffused and distributed throughout the inner surface thereof by the deflectors, as is well understood without further minute description, while the outer surface of the pile is maintained at a practically even temperature throughout and the heat is rapidly diffused by the water to produce the fall in thermic potential within the thermopile.

In the practical construction and maintenance of thermo-electric generators it is desirable to have the active element (the generating-cylinder) removable and renewable, so that it will not be necessary to injure the casing, which is comparatively expensive, every time a machine needs repairs or renewing. The active element is a comparatively inexpensive device and the only part that ever needs renewing within the life of the casing. Hence the importance and utility of this invention will be appreciated, as the active elements can be made to standard sizes and supplied separately and kept on hand by the user, and it will not be necessary to really destroy a machine to get at the active element, as heretofore, which really shortened the life of the entire machine to the life of its particular active element; but according to the present invention one casing will last indefinitely and the active elements can be renewed as desired. By this means the practical and commercial success of thermo-electric generators is greatly enhanced and their utility established.

It is evident that various changes might be made in the forms, arrangements, and constructions of the parts described without departing from the spirit and scope of my invention. Hence I do not wish to limit myself to the exact construction herein set forth, but consider myself entitled to all such changes as fall within the spirit and scope of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A thermo-electric generator comprising a supporting-casing forming a water-jacket, and the removable active element forming the

inner wall of the water-space and removable from the casing without disturbing the same, substantially as described.

2. The active generating element, as an article of manufacture, comprising the hard cylinder of refractory material inclosing the properly-connected thermo couples and having the end projecting metal jacket around the same, and the terminals extending through the refractory material to the exterior of the cylinder, substantially as described.

3. A thermo-electric generator having a supporting-casing with a top opening to permit insertion or removal of the active generating element, and the removable active element in said casing and forming a tight joint therewith so that the casing can contain water surrounding said element, substantially as described.

4. A thermo-electric generator comprising a supporting-casing having a bottom opening for the source of heat and a top opening to permit insertion or withdrawal of the cylindrical active element, the electrical terminals of the active element passing out through the bottom opening and removably secured so that they can be removed with the element, and packing and clamping means to form tight joints at the ends of the active element

so that the casing can contain water surrounding the element, substantially as described.

5. A casing of a thermo-electric generator having a bottom annulus with a central opening less in diameter than the active removable element, and inclosing side wall, a top having its top opening of such diameter as to permit insertion or removal of the active element therethrough, and a support for the casing, substantially as described.

6. A thermo-electric generator comprising the casing having the bottom opening with upturned flange, the top opening, the removable hollow active element resting on said flange, and having a metal jacket with projecting edges, packing into which said edges bite, packing at the upper end of the element, a top clamping-plate confining the parts and compressing the packing, and the top removable frame carrying the deflectors in the active element.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HARRY BARRINGER COX.

Witnesses:

O. E. DUFFY,
C. M. WERLE.