(No Model.)

H. B. COX.

THERMO ELECTRIC GENERATOR.

No. 434,428. Patented Aug. 19, 1890.

Fig 1

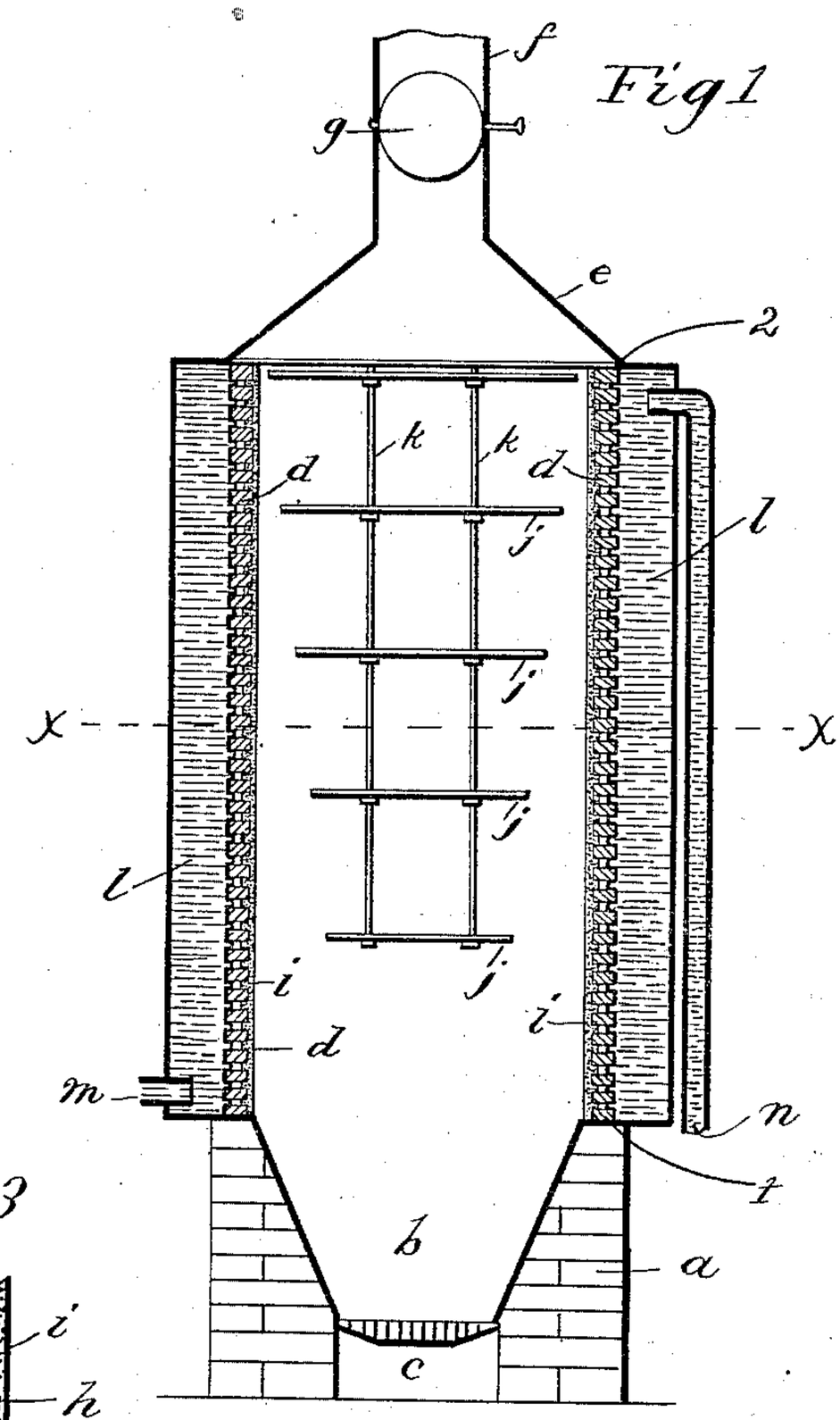


Fig 3

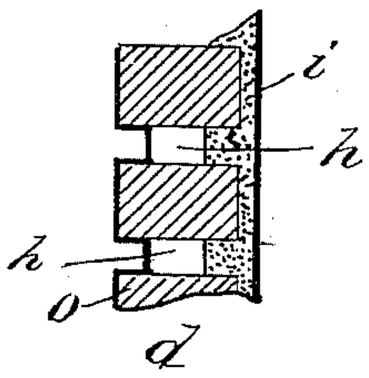
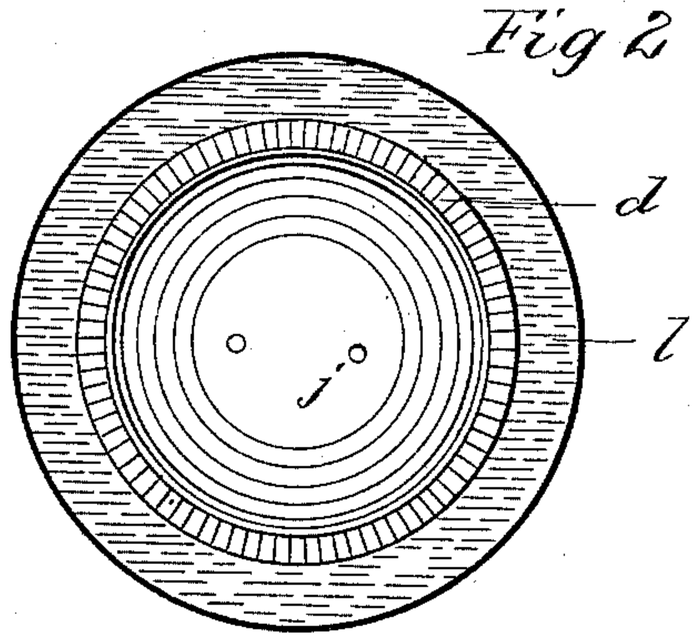


Fig 2



Witnesses
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UNITED STATES PATENT OFFICE.

HARRY BARRINGER COX, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE ELECTRIC GENERATOR COMPANY, OF PORTLAND, MAINE.

THERMO-ELECTRIC GENERATOR.

SPECIFICATION forming part of Letters Patent No. 434,428, dated August 19, 1890.

Application filed January 9, 1890. Serial No. 336,339. (No model.)

To all whom it may concern:

Be it known that I, HARRY BARRINGER COX, of New Haven, in the county of New Haven 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 this invention is to provide an improved construction of thermo-electric generator and furnace whereby an intense heat can be applied directly to the pile from the fire without the intervention of passages, chambers, rings, &c., which allow the escape of much heat and reduce the temperature of the pile; also, whereby the heat will be evenly distributed against the pile throughout its length, so that the temperature of the pile will be approximately even throughout, and also whereby the fall of potential or difference in temperature between the hot and cold junctions of the pile will be as great as possible; hence it will be observed that the primary objects of this invention are economy of fuel and a maximum quantity of current at a minimum cost. These objects are accomplished by and this invention consists in certain novel features of construction and in combination of parts, more fully and particularly pointed out hereinafter.

Referring to the accompanying drawings, Figure 1 is a vertical central section of the present improved generator. Fig. 2 is a cross-section in plane of line $x\,x$, Fig. 1. Fig. 3 is an enlarged section through several rings of the pile, showing the inner and outer coatings of the pile.

In the drawings, the reference-letter a indicates a furnace having the fire-pot b, open at the top, and an ash-pit c, separated by suitable grate-bars. This fire-pot or furnace is strongly and solidly built to form a support or foundation for the thermo-pile, and has suitable means of ingress and egress for the fire-pot and ash-pit. The open top of the fire is preferably circular, as shown.

The thermo-pile d is in the shape of a cylinder which rests on the top of the furnace a and forms a closed continuation upwardly from the open top of the fire-pot, and is provided with the top e at its upper open end, terminating in the smoke flue or passage f, having a damper g, whereby the fire in the fire-pot can be regulated.

The thermo-pile is composed of a number of rings resting one on the other and all electrically connected to form one circuit having the opposite poles 1 2. These rings are separated by asbestus, as shown by h, and the thermo-rings and interposed asbestus rings are rigidly clamped or otherwise secured together to form a single cylinder. Each ring is composed of a series of thermo-couples, consisting of unlike elements united as usual to have the inner hot junctions and the outer cool junctions.

The inner surface of the thermo-pile is provided with a suitable coating i of fire-proof material—such as cement—covering the inner ends of the elements a sufficient depth to protect the same from injury by the intense and direct heat from the fire-pot, and yet subject them to as high a temperature as they will stand without injury.

As so far described, the lower end of the vertical thermo-pile, if there was a fire in the fire-pot, would be highly heated, being nearest the fire, while the temperature of the pile would gradually decrease upwardly at the portions farthest from the fire; hence the temperature of the pile would be unequal throughout and the full power of the generator would not be derived. In order to avoid this difficulty and utilize all the heat in heating the pile equally throughout, a vertical series of the circular horizontal deflectors j are suspended in the interior of the pile above the fire-pot and from the top of the furnace by vertical supports k. The lower deflector of the series is located a distance above the lower end of the pile and directly above the fire, and is comparatively small in diameter, while the remaining deflectors of the series gradually increase in diameter upwardly, as shown, so that the topmost deflector leaves

but a narrow annular space between its edge and the top end of the pile for the passage of the heated products of combustion. Thus it will be seen that the portion of the pile farthest from the fire is kept as hot as the portions near the fire by means of the deflectors, which force the heat against the pile and to remain longer in contact with the same the farther it is from the fire. The outer ends of the elements of the pile are kept cool and at a low temperature by means of the surmounting water-jacket *l*, having the induction-pipe *m* and the eduction-pipe *n*, so that the water will constantly circulate through the jacket, and thus always be kept cool. The outer wall of this jacket is formed by an outer casing, as shown, surrounding the outside of, and located a suitable distance from the pile, and the inner wall of this jacket is formed by the outer surface of the pile itself, and hence the water is directly in contact with the outer ends of the elements of the pile, which outer surface of the pile is preferably coated, as shown at *o*, with some non-conducting material—such as paint—to form a water-proof coating to prevent the water from leaking between the rings and elements of the pile and to prevent loss by conduction of the water. Hence it will be seen that the cool water is directly applied to the outer surface of the same, whereby the fall in thermic potential in the pile is maximum, or as great as it can be.

It is evident that various changes might be made in the form and arrangements of the parts described without departing from the spirit and scope of my invention; hence I do not wish to limit myself to the precise construction herein set forth, but consider myself entitled to all such changes.

What I claim is—

1. In a thermo-electric generator, the combination, with a fire-pot or furnace open at the top, of a cylindrical thermo-pile around and extending above the open top of said fire-pot, forming an upper continuation of the same, so that the heat is applied direct to the elements of the pile.

2. A thermo-pile consisting of a series of couples secured together, having their inner ends or surface with which the heat comes in contact provided with fire-proof cement and their cool ends provided with a protective covering, as set forth.

3. A thermo-electric generator consisting of a furnace, and a thermo-pile forming an upward continuation of the furnace fire-pot, whereby the heat is applied directly to the interior of the pile, and a fire-proof coating covering said interior of the pile to protect the metal elements, substantially as described.

4. In a thermo-electric generator, the combination of a hollow thermo-pile, a fire-pot at one end of the same, an exit at the other end of the same, and a lining of fire-proof cement on the interior of said pile to protect the metal elements of the same from injury, substantially as described.

5. In a thermo-electric generator, the combination of a fire-pot open at the top, a cylindrical thermo-pile resting on said fire-pot and extending up from the same, and consisting of a vertical series of rings, a fire-proof coating on the inner surface of said pile, and deflectors located therein above the fire-pot to equalize the temperature of the pile throughout its length, substantially as described.

6. In a thermo-electric generator, the combination of the fire-pot, the hollow cylindrical thermo-pile extending up from the same and provided with an exit at the top, and a vertical series of horizontal circular deflectors located in said pile above the fire-pot, the deflectors of said series increasing in diameter upwardly, for the purpose set forth.

7. In a thermo-electric generator, the combination, with the hollow thermo-pile, of a furnace or open fire-pot at one end of the same, of which the pile forms a continuation, and a water-jacket surrounding the exterior of the pile, substantially as described.

8. A thermo-pile inclosing a vertical heating-chamber, a source of heat at the bottom of said chamber, and a series of deflectors in said chamber arranged therein so as to evenly distribute the heat throughout the length of the pile, as and for the purposes set forth.

9. The combination, with a thermo-pile inclosing a heating-chamber, of a water-jacket around the outer surface of said pile, the pile forming the inner wall of the jacket and a casing the outer wall.

10. In a thermo-electric generator, the combination of the hollow thermo-pile having a fire-pot or furnace opening into one end of the interior thereof and a water-jacket surrounding the exterior of the same and provided with water-circulating pipes, the outer surface of the pile forming the inner wall of the water-jacket, substantially as described.

11. A thermo-electric pile consisting of rings resting on each other and having asbestus interposed between said rings, said rings and asbestus being rigidly secured together and the rings electrically connected and composed of series of alternately-unlike elements, and protective coatings for the inner and outer surfaces of the pile.

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

HARRY BARRINGER COX.

Witnesses:

JULIUS TWISS,

JONATHAN W. POND.