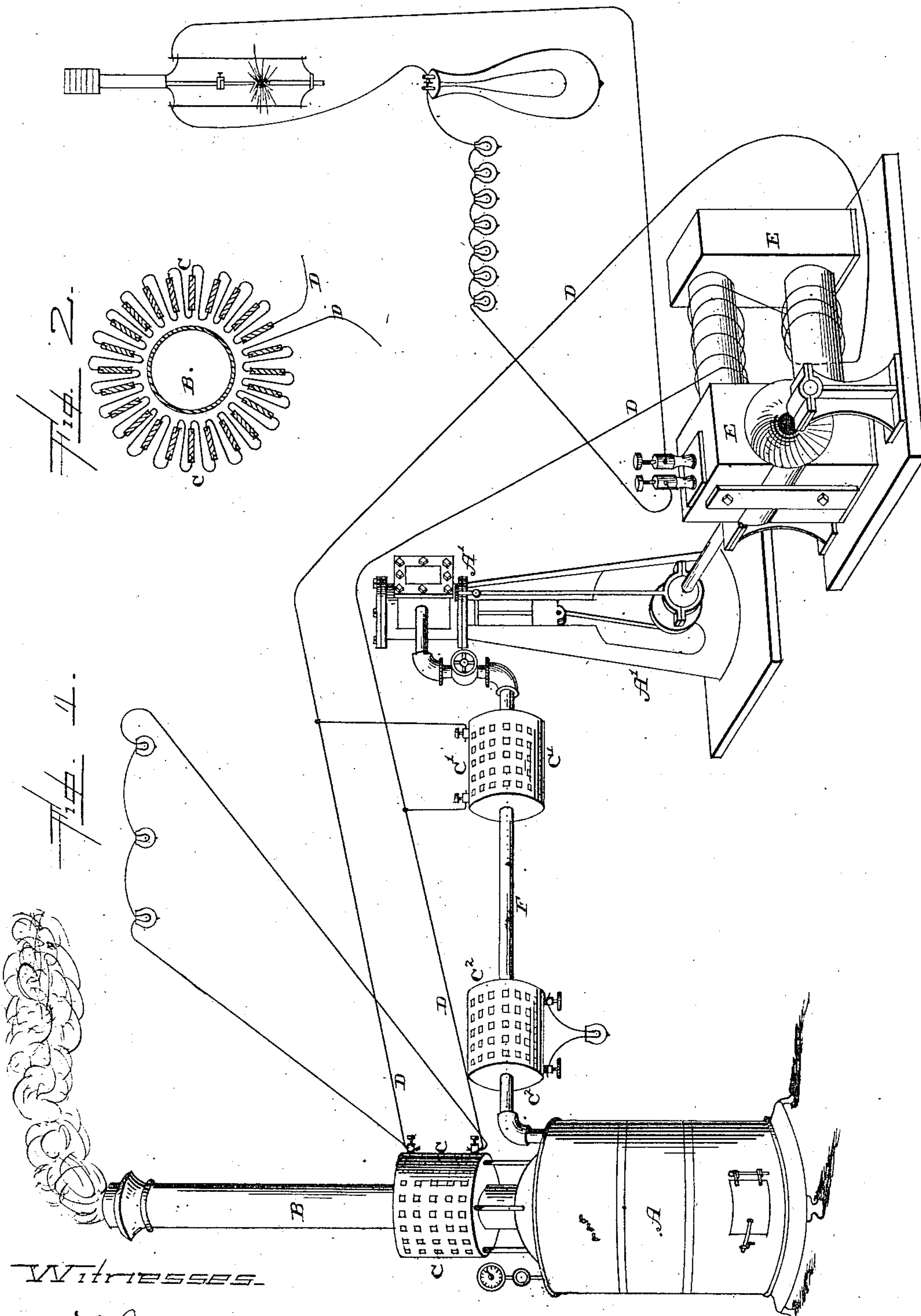


(No Model.)

L. G. WOOLLEY.  
ELECTRIC GENERATOR.

No. 369,219

Patented Aug. 30, 1887.



Witnesses.

X. F. Gardner  
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# UNITED STATES PATENT OFFICE.

LEONIDAS G. WOOLLEY, OF GRAND RAPIDS, MICHIGAN.

## ELECTRIC GENERATOR.

SPECIFICATION forming part of Letters Patent No. 369,219, dated August 30, 1887.

Application filed November 20, 1886. Serial No. 219,505. (No model.)

*To all whom it may concern:*

Be it known that I, LEONIDAS G. WOOLLEY, of Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Generation of Electricity; 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in the generation of electricity; and it consists in the combination of a dynamo, a steam-boiler, steam-pipe, or other such source of heat with a thermo-electric pile, which is applied to some portion of the boiler, the smoke-stack, or the steam-pipes, as will be more fully described hereinafter.

The object of my invention is to utilize the heat generated in a steam-boiler, or which is radiated from pipes through which the products of combustion or steam pass, in connection with a thermo-electric pile, which is applied thereto in such a manner as to generate an even steady current of electricity to charge the dynamo, and which is suitable for arc or incandescent lighting, telegraphing, electroplating, and other such uses.

Figure 1 represents an apparatus to which my invention is applied. Fig. 2 is a horizontal section taken through the thermo-electric pile.

A represents an ordinary steam-boiler of any suitable construction; B, the stack; F, the pipe which conveys the steam from the boiler to the engine A', the shaft of the engine being connected directly to the armature of the dynamo. Applied directly to the smoke-stack B, the steam-pipe F, or to any portion of the boiler A itself is a thermo-electric pile, C C' C'', which will be constructed in the usual manner. This pile may be of any desired size or length, and either only surrounds a portion of the smoke-stack or the pipe F, as here shown, or may be made large enough to surround the whole stack or the whole length of the steam-pipe, as may be preferred. These piles may

be inclosed within suitable jackets, if so preferred.

The heat which is generated from the stack B, from the waste products of combustion, or from the steam-pipe F heats the inner junctures of the thermo elements, while the outer junctures of the thermo-pile are kept moderately cool from being exposed to the ordinary temperature of the air, and hence a current is produced and kept constant regardless of any mechanical or dynamic effect. This current thus produced is preferably used to charge the field of force in a dynamo-electric machine, E, but may be used to operate an independent circuit for incandescent lamps, as shown; or the circuit may be divided and a portion of it used to supply the field-of-force magnets in a dynamo. Those piles placed upon the steam-pipe F may either be used for incandescent lighting, or positive and negative wires extending therefrom may be connected to the wires D, which extend from the poles of the pile C, placed around the stack, as may be preferred. Either one of the piles may be used separately, or they may all be connected together, just as may be preferred. Should it be desired, wires may be made to extend from the dynamo, and used for both arc and incandescent lighting, as shown.

The constant supply of electricity such as is produced by thermo-piles will maintain a very even and uniform field of force in a dynamo-electric machine, regardless of the external circuit resistance which will be caused from a long or short arc, or the turning on or off of lamps. Where a dynamo has its field of force supplied direct from its armature, any variation of the external circuit greatly affects the magnetic intensity of the field, and hence produces an unsteady current. It is also a matter of considerable economy where a field of force in a dynamo is supplied from other sources than that of its own armature; and the armatures of the dynamo being revolved under the influence of a powerful magnet-field, by means of a steam-engine, produce any desired current, according to the size of the conductors on the armature, up to the full capacity of the steam-engine.

Having thus described my invention, I claim—

5 The combination of the boiler, a pipe or stack extending therefrom, a thermo-electric pile placed thereon, the steam-engine, and the dynamo driven thereby, the wires extending from the thermo-electric pile being connected to the dynamo for the purpose of charging it, substantially as shown.

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

LEONIDAS G. WOOLLEY.

Witnesses:

JOHN B. GRIMES,  
JOHN H. DEAN.